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REGIONAL POPULATION GROUPS OF ATACAMA,
PART II—(CONCLUSION).*

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THE PAYTA AND PIURA VALLEY REGION.

At the comparatively busy port of Payta, in northwestern Peru (see map, p. 143), one finds an export trade in cotton, rice, and sugar, and the markets, for all the sterility of the immediate desert, are crowded with tropical fruits. As in so many cases along the coast of Peru, the busy port is but the reflection of a rich and distant hinterland where water from the mountains is directed to the service of man. Such is the relation of the forbidding region about the port of Lomas to the rich Lomas Valley, of Salaverry to Truxillo, and of Payta to Piura.

The best account of the Piura Valley (east of the port of Payta) yet written was published in 1895 by A. F. Sears.† He describes the tremendous burst of life that the inconstant rains bring to the thirsty land. For a week or a month, cattle and great herds of goats wander out of the irrigated valleys and revel in the fresh pastures on the plateau. What with their close grazing, and the increasing dryness, the desert soon reverts to its original condition. The brilliancy of this short, moist period is little short of marvelous. The red-petaled papita of San Juan decks the heretofore naked plain, and innumerable species of *Oxalis*, *Crucifers*, and *Amaranths* occur, living on the nourishment drawn by their long, penetrating

* Part I printed in BULLETIN, March, 1909.

† BULL. Am. Geog. Soc., Vol. 27, No. 3, 1895.

roots. The algarroba, a stunted honey locust or mimosa, growing in the valleys, springs up on the plain, likewise the sapote del perro (sapodilla), so called because the hungry dogs of the valley towns roam over the pampas in search of its fruit.

There is an interesting story current in Piura concerning a novel human response to these irregular rains. An enterprising cholo or half-breed built an inn in the middle of the desert and furnished



IRRIGATION DITCH AT PACASMAYO, PERU.

Poplars and willows live on the banks and retard evaporation, which is excessive in this dry climate. Their roots are supplied by seepage and serve also partially to protect the banks from scour. The canal is bordered by prosperous farms and gardens for many miles.

food and water to travellers, getting these supplies from the port 20 odd miles away. No sooner had he become well established than the owner of a distant hacienda demanded rent for the bit of desert land. The rent was paid perforce because the claimant had a grant from the Spanish crown by which it was shown that the hacienda extended toward the foothills of the Andes *as far as the goats*

could go before they returned to the river for water; and it was known that every seven years the goats of this hacienda went far beyond the position of the inn before they returned to the River Chira!

The thorough wetting of the desert, about every seven years, results in five crops, two each year, and then the land rests until the end of the seven-year cycle, except in the valley bottoms where irrigation maintains the fertility of the soil.

When the floods are due the people ask every traveller from up valley where the river was when he passed. If he reports it coming, a crowd of eager listeners and questioners surround him as if he brought, as indeed he does bring, important news. As it approaches the upper haciendas the Indians turn out to welcome it with fife and drum and fire rockets. The news is passed around that the river is but a league away and will be here to-day. The people ride out to meet it and no fiesta in northern Peru is equal to the one on this occasion when the now tireless multitude goes out to seek the river. The affair reaches a climax when the river, at first a tiny rill, arrives at the bridge of Piura where commonly 5,000 people turn out to escort the river to the city. At the city of Catacaos (25,000 population, and the fifth city of Peru*), 6 miles lower down the valley, it is met by 15,000 people, so that the river has a triumphant march from the mountains to Sechura, where it enters the sea.

These eager inquiries for the river suggest those which are reported from Arabia. The infrequent thunder storms of spring scatter their showers so irregularly that one place, a few miles square, may be abundantly watered while all the rest of the Arabian desert, for leagues around, may continue parched and lifeless. The shepherd searches for these watered places constantly and every traveller who passes by is hailed for information as to the amount of the rain and the state of the pasture.†

The cotton of Piura is one of the most celebrated varieties in the world and experiments looking toward its production elsewhere have resulted uniformly in failure. It has a long, woolly and exceedingly tough fibre and is distinctly the product of local climatic conditions, hence the Piurians have a monopoly of its culture. The whole valley is largely given up to its production, for its market value is twice that of ordinary cotton. It is produced in twelve shades, ranging from a pure white through buff, pink and light

* Sievers, *Süd-und Mittel-Amerika*, p. 446.

† Doughty, "Arabia Deserta."

brown to a rich, dark red brown, and is used in the manufacture of fine underwear and hosiery and in the adulteration of fine woolens as a protection against shrinking.

Besides cotton, some sugar and rice are produced for export, in especially large quantities after each 7-year rain. During a call at the port in September, 1907, Chinese rice was being imported by a Japanese firm, in a British steamer, manned by a Japanese crew. The cheaper and inferior Chinese rice was imported for the labourers of the Piura Valley and the superior crop of rice the Piurians themselves had produced was exported to Chile and Europe leaving a net profit, of considerable amount, for the *hacienderos*.



THE PORT OF SALAVERRY, PERU.

A typical coast town, whose size and general aspect are not at all comparable to the fertile Chimu Valley and the city of Truxillo, with which it has connection by rail. Such coast ports in Peru often have a most forbidding appearance, but are not safe indications of the conditions of the hinterland, where irrigation from mountain streams maintains a high degree of fertility.

The borders of the mountain streams that cross the desert plateau are lined with algarroba trees and the exceptional culture of these is one of the characteristics of the Piura Valley. During the dry season, when forage on the flood plain is limited or exhausted, the cattle, goats, and donkeys thrive upon its foliage and the long green pods it bears in incredible quantities. It even supplies food to the people. The trunks and branches and long thick roots of the dead algarroba trees are burned for fuel. Charcoal is also manufactured from it in great quantities for export to Eten, Salaverry, Callao, and even Iquique, where it brings 40-50 cents per quintal (100 lbs.) The goats, that hunt the desert for every scrap of succulent herbage

and are herded in the valleys in great numbers, are a source of revenue for their skins chiefly. These are shipped out of the country for manufacture and bring, in Peru, 40 to 50 cents per pound. A goat skin weighs, on the average, about 2 or $2\frac{1}{2}$ pounds.

The Piura is like the Nile in the relation it bears to its waiting people. The river rises once every year and to exceptional heights once about every seven years. In times of unusual flood two crops may be produced even on the farther portions of the flood plain. The St. John's crop is harvested in August or September and the Christmas crop late in December or early in January. The latter is but half or two-thirds the size of the former. The seed for it is planted in March and, as 10 months are required for the growth and maturity of the crop, it matures during the drier portion of the year. In 1906 the river did not supply as much water as usual and the Christmas crop was only about 2,500 bales. There was a good overflow following the harvest and the St. John's crop for 1907 was estimated at 30,000-40,000 bales.

THE COPIAPO-COQUIMBO REGION.

The classic description of the southern end of the great coast desert is that by Darwin*, whose notes, although written in 1845, are more illuminating of that section to-day than the hurried observations of all others who have since written of this land. It is customary to write of the desert section of Chile as a country of interest only through its mineral resources of nitrate, copper, and tin. This treatment ignores the populations of greatest anthropogeographic interest—the isolated, unaffected, local groups of indigenous peoples who cling with independence to the watered areas of the desert. Except for slight and obvious modifications, Darwin's description is applicable to the country to-day.

Valparaiso, or Valley of Paradise, practically on the southern border of the desert, was so named because it was the first green valley seen from the Spanish caravels as they coasted south from Callao. Yet it, too, is a land of uncertain rain and that joyful designation of its first white visitors would have been more abidingly true had it been reserved for one of the happier valleys farther south. The winters are frequently so dry as to injure the pastures, although this is the rainy season of the year, while the rainless summers wither the grasses and give the whole countryside a parched and

*A Naturalist's Voyage. *Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H. M. S. Beagle Round the World*, London, John Murray. Ed. of 1890, p. 323, *et seq.*

brown appearance. The Valley of Paradise is, therefore, an intermediate tract receiving uncertain quantities of winter rain, a border region looking on the one hand toward the better-watered southern valleys, on the other hand toward utter desert, the region to which Darwin said he was tired of applying the epithets "sterile" and "barren."

Between Quilimari and Conchali, 60 odd miles north of Valparaiso, the country becomes more and more barren. In the valleys there is scarcely enough water for irrigation and the intermediate land is so bare as not even to support goats. A thin sprinkling of vegetation appears only in spring after the winter showers. The cattle are then driven down from their summer pastures in the higher Cordillera to graze for a time on the meagre fields of the desert. Although Conchali is but a degree north of Valparaiso its rains are not expected to begin till the end of May, whereas at Valparaiso some rain generally falls early in April. As the time during which the heaviest rain falls is limited pretty closely to the height of the winter season, which, in the desert and the mountains, corresponds closely to the time of the winter solstice, this late beginning of the winter showers is sufficient index of the small total precipitation.

At Coquimbo, farther north, the rains are still lighter. The farmers break up their ground after the first shower, sow their seed if a second occurs, and if a third shower falls reap a good harvest in spring. The farms on the sea coast are more fortunate than those up-valley for the cooler and more humid atmosphere retards the evaporation of the precious rain. Ten days after a shower all the hills are faintly tinged with green, the grass being sparingly scattered in hair-like fibres a full inch long, whereas, before the shower the surface appeared as bare as a highway.

In the Guasco Valley, latitude 28° S. and north of Coquimbo, rain is practically absent for 3 or 4 years in succession, only one or two showers falling during that time. A rainy year generally follows this dry period. The rains may then do more harm than the drought. The rivers swell and injure the irrigating ditches, strewing great banks of infertile gravel and sand upon the cultivated terraces. The Guasco Valley is typical of many of these desert valleys in having a line of towns along it. At the mouth there is the desert port, without any water in the immediate neighbourhood; five leagues higher stands Feyrina, a long, straggling village; ten leagues further is Balenar; and above this the horticultural town of Guasco Alto, famous for its dried fruit. The towns are supplied with water from the

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melting snows in the far-distant Cordillera and their fortunes are thus bound to the vicissitudes of the mountain storms and the changing temperatures. Heavy snows, with high temperature succeeding, mean prosperity and happiness in the valleys; the time of light snows is the time of want. In these valleys of Copiapó, Huasco, and others adjacent, the inhabitants watch a storm over the Cordillera with great interest, as one good fall of snow provides them with water for the ensuing year. Without snow, desolation extends throughout the valleys. Several times before mining development began, nearly all the inhabitants of the valley of Copiapó were obliged to emigrate to the south. Darwin states* that, in the year of his visit, there was



LOOKING EAST, NEAR THE PORT OF FISCO, PERU, AT THE CITY OF FISCO.

An irrigated cotton field is in the foreground and middle distance. Water is supplied by a mountain stream. The extraordinary fertility of the soil and the luxuriance of the foliage are in marked contrast to the desolate aspect of the port and the country immediately adjacent.

plenty of water and each man irrigated his ground as much as he chose, but that frequently it had been found necessary to post soldiers at the sluices to see that each estate took only its proper allowance. The valley was then said to contain 12,000 souls with produce sufficient for three months only, the rest of the supply being drawn from Valparaíso and the adjacent valleys of Chile.

Every winter the inhabitants hear with envy of the rains to the south and hope, without fail, for a share in the good fortune of their neighbours, even though their hope is seldom realized. For a mod-

* *Ibid.*, p. 336.

erate rain is a distinct addition to their mountain supply. It falls alike upon the valleyside farms of the poor and valley bottom lands of the rich and means relative plenty for all in the year to come. Even the mendicant shares in the general happiness as the more bountiful harvest is reflected in the increased generosity of his prosperous patron. The chief advantage of the occasional rain is not, however, in the water it supplies to the valleys but in the pasture it creates afield. The cattle and mules then range over the desert and the lower slopes of the mountains and, for a time, relieve the valleys of the burden of their subsistence.

Darwin also notes* the belief of the inhabitants in some connection between earthquakes and rain. It is the more interesting in this locality because the extreme infrequency of rain reduces the probability of accidental coincidences. Furthermore, rain sometimes follows earthquakes at the dry period of the year when the rain is a greater prodigy than the earthquake. To the minds of the inhabitants an earthquake foretells rain as surely as rain foretells abundant pasture. On Darwin's mentioning the shock at Coquimbo to the people of Copiapó they immediately cried out: "How fortunate! there will be plenty of pasture here this year."†

The intermediate part of the west coast desert, which is most arid and inhospitable to man, is typified by the conditions that exist in the desert of Tarapacá which, with Atacama, constitutes the northern half of Chile. Considered from the standpoint of man it is even more interesting than are the ends of the desert where the transition is made to more favoured lands. The study of this section of the desert and the relation of its people to the sea and the Bolivian hinterland was one of the chief objects of the Yale South American Expedition of 1907.

THE TARAPACÁ REGION.

It is the special quality of the desert of Tarapacá that, in general, its eastern marginal streams from the high Andine plateaus and mountains do not, as elsewhere in the desert on the west coast of South America reach the Pacific. In the geomorphologic view, it is the only truly desert portion of the entire arid coast. For a desert, in the geomorphic sense of the word, is defined as a region of interior basin drainage whose streams at first discharge centripetally with respect to the initial basins to which they are tributary, this condition being followed by drainage integration and desert leveling. While this definition of the desert is, in general, appropriate enough in the

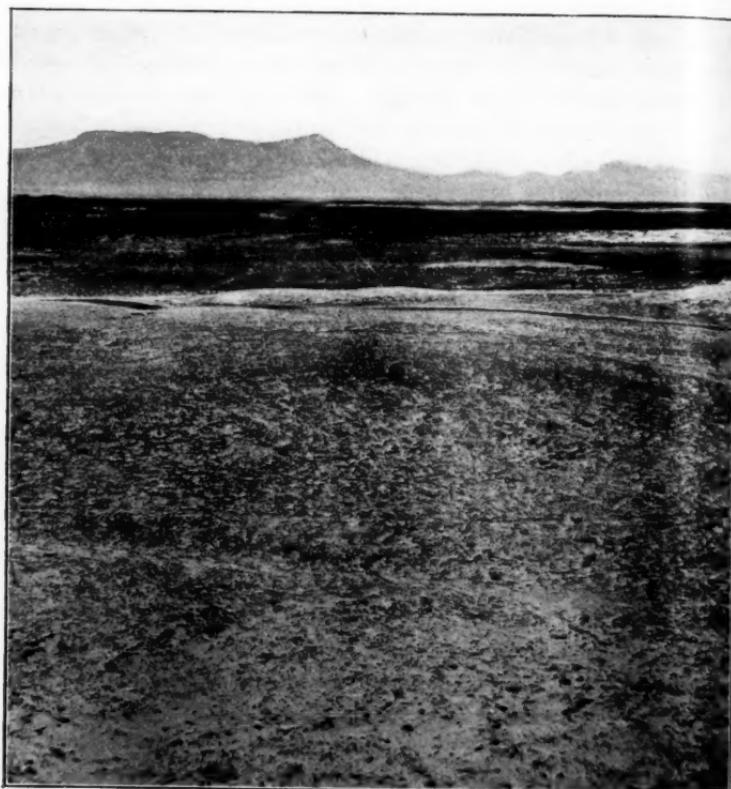
* *Ibid.*, p. 337.

† *Ibid.*, p. 337.

interpretation of desert physiography there are very important exceptions. Along much of the west coast of South America, save for that small portion east of Iquique and a few hundred miles long north and south, the desert of Tarapacá, the pronounced westward slope of the western margin of the uplifted peneplain now constituting the Maritime Andes, has completely overcome the effect of the minor deformations. It is these minor irregularities that, with a less pronounced regional slope, generally give rise to a system of interior basins with characteristic centripetal drainage. The entire coast, from Payta, in northern Peru, to Valparaiso, in central Chile, with the single exception of the Tarapacá region, is, therefore, characterized by the absence of interior basins, notwithstanding its almost absolute aridity. It is, indeed, a desert in the truest sense of the word if we define the desert, as it should be defined, not with respect to geomorphic conditions wholly, but also with respect to those conditions of water supply which lead to the development of a sparse and specialized population. The geomorphic considerations are of great value, however, as they lead us to grasp the more readily the nature of structure and topography and their controlling influence over the space relations of streams, mountains, and sea. Throughout the desert on this west coast of South America the rivers, though more or less intermittent, in general reach the sea; the drainage is, in general, at right angles to the shore line, not centripetally arranged; the population is oriented with respect to the coast and the coast valleys, not with respect to a system of interior basins; the sea, not a line of oases, is the great highway of the region, the great unifier. The only exception is the desert of Tarapacá.

If we contrast Tarapacá with that portion of Atacama in central Chile, we see that the latter has a valley system related to the sea and that the last important valley toward the north from the southern end of the coast desert is Copiapó. From this point on, the streams of the Maritime Andes are lost in a line of salars or salt-encrusted plains, occupying the broad depressions, the interior basins between the low coast ranges and the foot of the Cordillera. The sole exception is the Loa River north of Antofagasta, whose more important features will be set forth in detail in a later paragraph. From the mouth of the Copiapó toward Antofagasta only one short, unimportant stream, fed from the trifling and uncertain showers that fall in the Coast ranges, descends precipitously to the sea. It occupies the miserable little valley of Paposo, 25° S., and is a fit ending to this line of dwindling streams. The only vegetation found north of this wretched valley is that already described as

occurring at the level of the cloud canopy that hangs over the edge of the land. At this level, tiny oases may occur if the situation is peculiarly favourable. Thus, 8 miles back of Antofagasta, at an elevation of 1,600-2,000 feet, is a bright little spot of grass and flowers caused by the heavy dews and mists. Some goats are raised and even a few vegetables. The goats sip the dew from the spoon-shaped cactus leaves in which it gathers, a spoonful or more, in each.



VIEW OF THE COAST DESERT BACK OF THE PORT OF ETEN, PERU.

In the middle distance is a slight sprinkling of vegetation upon the valley flat of a stream heading in the mountains.

What with this and an occasional drink of salty water from some stagnant pool they are able to subsist.

Toward the north, the streams of the Maritime Andes find the sea again at Pisagua, where the volcano-crowned plateau swings toward the west. Thus, for 500 miles from Copiapó to Pisagua, the Loa is the

only river of any consequence that reaches the sea and it accomplishes this only in years of heavy snowfall in the mountains. In all this stretch of desert the coast ranges are thus broken but once. The mountain streams dwindle and fail on the inner side of the desert where their waters are absorbed by the deep porous sands and gravels that form a piedmont slope 350 miles long.

Each failing stream—Aroma, Tarapacá, Huaschiña, Mamiña, Quisma, Salado, Huataconda, Chacarilla, and others—is the locus of a village or a line of villages. Each stream is deeply incised below the level of the broad slope that directs it westward to the inner eastern edge of the desert. Thus there are two chief classes of routes of travel: east-west routes along the axis of the incised streams; and a north-south route at the inner edge of the piedmont where the streams terminate. The trails are for this reason arranged in a roughly quadrilateral fashion. Within the mountainous area of the plateau, where numerous volcanic peaks occur, the trails are more irregular in direction, but along the inner (eastern) edge of the Maritime Andes the bold scarp, which forms the western limit of the central salars of Bolivia, again determines a north-south highway of travel and trade. Departures from this quadrilateral pattern are numerous but the travel over them is in general much less than over those arranged in conformity with the major topographic and drainage outlines. In addition, the departures are difficult trails zigzagging up and down steep-sided and deep quebradas or gorges and often traversing the most difficult sandy wastes.

An examination, either of the history or the present condition of the villages occurring at the mouths of those valleys having a permanent water supply, leads to the conclusion that they, of all the desert places of South America, have been bound to the wheel of physical circumstance. In no other localities have the local times and seasons been so clearly reflected in the fortunes of the people. Elsewhere there have been means of escape if Fortune frowned too sternly, as when the inhabitants of Copiapó three times emigrated to the south. But Copiapó is in touch with the sea—its valley opens out upon the coast. On the other hand, so far as these interior villages were concerned, as well might the coast be a thousand as a hundred miles away. Their streams wither far from the sea, and naked desert and an uninhabited coast repelled all occupation or movement in that direction. The fortunate places were in the mountains and on the inner edge of the desert, away from the sea. And there they are to-day for any population unit which must subsist upon what it produces from the soil. Before nitrate and copper

were produced and the modern artificial coast towns—Iquique, Pisagua, Tocopilla, Culeta Buena—came into existence, the coast ranges and the wellnigh impassable desert, intervening between them and the Andes, might have been a great continental desert interior, like “The Dead Heart of Australia.” Its effect could have been no greater upon these inner desert towns. They looked to the mountains for their subsistence, not to the sea. It was of far more importance then that the winter’s snows, whose amount they marked with great concern, should be unfailing, than that the vessels of distant ports and countries should ride at anchor off their repellent and distant shores. Incredible as it may seem from an examination of a small scale map of South America on which these towns appear almost on the coast, it is yet true that before the nitrate business was established, the isolation of these towns was almost as complete, their connection with the sea almost as remote and unimportant as is that of the similarly located piedmont towns of the northern slopes of the Kuen-lun and Altyn Tagh Mountains of Central Asia so graphically described by Huntington.*

The sea and the desert were one in the absence of any easy means of securing food from them. And the oases, separated by wide stretches of utterly barren rock and sand, were like oceanic islands in the degree of isolation they possessed. In them no single movement of any consequence was ever originated. Economically they are the least important units in Chile. Their chief consequence to the world of progressive men has been their service to land travellers who have utilised them as links in the chain of communication from central Chile to southern Peru, and from the mountainous hinterland to the coast. For example, they were determining forces in the extension of the Inca Empire. Their absence would have meant a more northerly frontier. They furnished food and water and men to the imperial armies and constituted bases of operations in the progressive conquest of the southerly lands. They were population units incapable of any initiative and only passively and, in a certain sense, unconsciously serviceable to movements initiated in less hospitable regions nearby. Almagro’s army would have perished to a man, as, without ships and with an uncharted ocean of sand and salt before them, they made their precarious way northward from central Chile, had it not been for the occasional oases scattered along their line of march. The prospectors of a later day and the traveller of the present use them to similar purpose. Without them the desert

* “The Pulse of Asia,” p. 153, *et seq.*

would not be traversable except at enormous expense of money and energy and time.

It is quite commonly supposed that in every desert where people reside there is subsistence for beasts beyond the margins of the oases. It is easy to see how this supposition originated. From the earlier generalized picture of the desert as a rainless, unpopulated, sandy waste, some have turned to another scarcely less inaccurate, that represents all deserts as habitable places with sufficient drought-resisting vegetation scattered about to sustain at least a pastoral population. What both conceptions lack is an appreciation of the variety that deserts, as all other lands, display in the matter of habitability. It was believed after Frémont's exploration in our Southwest that "The Great American Desert" was one of the formidable deserts of the world; later study of the whole, and the partial occupation of exceptionally well-favoured areas within it, have led a considerable body of loose writers to discard the phrase entirely and look upon the whole of our vast public domain in the West as habitable. Yet there are 70,000,000 acres of intensely desert land* there to-day not reclaimable even for grazing by the existing resources of science. Likewise in the case of the Sahara some have expressed too emphatically its universally desert character, a too hasty generalization based on an intenser study of and greater familiarity with the uninhabited places. To this the recent works of Gautier and others have supplied a useful warning in pointing to the large inhabited areas†, not to mention the ultimately inhabitable regions not yet occupied by man.

It has already been noted that no vegetation can be found from 2,000 feet to 8,000 feet, in these portions of the deserts of Atacama and Tarapacá, except where the mountain streams debouch upon the piedmont slope. It is a thoroughly plantless region; not even that almost universal sign of the desert, the cactus, can be found; downright nakedness prevails. This complete barrenness of the desert pampa, outside the borders of the oases, at once denies even a pastoral occupation over the wide expanses of the region. Flocks are kept in certain numbers but they must forage on the cultivated plants of the garden farms: alfalfa, millet, etc. Not even the temporary range noted at Payta and Copiapó, and due to an occasional shower, exists here. Beyond the oases there is nothing, except in the mountains above 8,500 feet, and access to these exceedingly thin mountain pastures is denied over much of the year by the extreme

* "Irrigation in the United States," F. H. Newell, 1902, p. 28.

† "The Desiccation of North Central Africa," The Monthly Record, *Geog. Journ.*, June, 1908, p. 676.

scarcity of springs and streams that may be relied upon for drinking water. Only during a few months of the spring can certain restricted areas of mountain pasture be relied upon. Of other pasturage there is none except in some under-developed oases where poorly watered marginal tracts, rarely more than a few square miles in extent, support a wild growth of temporary grasses and perennial shrubs which, for a short time, bear certain quantities of succulent foliage.

The population, by reason of its aloofness from the ocean and the lack of herbage afield, is sedentary to a degree. It consists of farmers deeply rooted to that portion of the soil watered by the mountain streams. Each agricultural or horticultural area is to a high degree



ON THE EASTERN EDGE OF THE DESERT OF TARAPACÁ.

Looking west at the oasis of Matilla in Chile. The situation is east of the great nitrate port, Iquique. The coast ranges, 30 to 40 miles away, may be identified in the background. The white band in the right middle distance is the broad trail leading from Pintados, on the railway from Iquique to the nitrate establishments at Lagunas, to Pica, the large oasis a few miles east of Matilla. The tower on the left is for the light which guides the night traveller to the village. The Quisma River, fed by light uncertain rains and melting snows, here irrigates some of the most beautiful gardens in Chile. It terminates a mile or more beyond Matilla, except at times of flood. The flood waters are partially impounded in a reservoir from which they are gradually delivered as needed.

a self-centered unit. Formerly this quality was much more evident than now. To-day the great industrial development which the exploitation of the nitrate has brought about has stirred the oases dwellers out of their lethargy. Fruit is required at Iquique, and Pica and Matilla supply a part of it, and thereby acquire a taste for the products of the town. Labourers are in high demand all through the nitrate region and the populations of the oases, crowded from

the standpoint of water-supply and food resources, are often drawn upon for the service of the nitrate oficinas or establishments.

Yet the material independence of the oases peoples is clearly persistent to a certain degree even to-day. It is a product of the wide spaces between population units. No better example could be cited of man fighting sheer space, with less to be gained at the end of the fight, than here. When one conquers the waste spaces of the sea he has, within certain rather wide limits, his choice of lands to touch and products to secure; but here, a similar climate and similar conditions of soil and water-supply are reflected in a damning uniformity of agricultural products. The clearest working of the economic law this embodies is seen in a year of misfortune at any one of the oases, the adjacent ones experiencing a normal year. Thus a dam sometimes breaks, and the accumulated waters rush through the fields and terraces of the intensively cultivated valley and wash out a large share of the crops for the year. The emptied reservoir remains dry until the following season and discomfort, if not actual want, prevails in the valley. The thinkable consequence of this condition is that the surplus products of a neighbouring valley are brought to the stricken group. Instead, the long distance to be overcome and the consequent high cost of transportation to be met by the consumer all but forbid such a course. The consumer has no resources to speak of and must buy cheaply or not at all. He can endure want but he cannot buy what he has no money and no way of getting money to pay for.

There is clearly in this case a relative economic loss and in some cases the loss is absolute, as when an unused surplus of perishable fruit or bulky forage is not sold to a neighbouring valley.

As a consequence of the wide spaces to be overcome with perishable or bulky goods, or even any goods at all, the prices for staple commodities vary greatly from place to place. In May, 1907, we found free pasture at the uninhabited grassy camp known as Chaia, a tributary of the Chaqarilla gorge; at the oasis of Chaqarilla a half-day's journey west, forage was free, if the natural growth was desired; a few shillings the quintal, if it consisted of barley from a cultivated terrace; while at Pica, 30 miles northeast, it was 8 pesos, or \$2 gold, per quintal. Where there is none to spare sometimes money cannot buy forage even of the worst kind; where there is plenty, it is very cheap; where there is a surplus it is given away, and where there are no inhabitants it belongs to the first comer. It is the ratio of supply to demand at a given restricted and isolated locality that determines the price, not the ratio of the aggregate

supply to the demand of the whole geographic province. In short, there are no railroads and only the most primitive means of carriage for freight and passengers; and no specialized production or adequate equalization of surplus products of any kind. Furthermore, these primitive means of communication mean great expense. The prices for food, fruit, forage, and the like are as high in many places as in New York City. The price depends on the locality, the extent to which the commodity is locally produced, and the degree of abundance of the crop for a particular year.

In general, one must grow one's own produce or live very expensively. A wine produced at Pica, Chile, can be purchased for a fraction of a dollar a bottle; imported wines cost, if one can get them at all, nearly \$2 per bottle. In Italy or France one can purchase flask and wine of precisely the same kind for a few cents. Only a rich mine or a thriving business enables one to live permanently upon the market and not have one's own vine and fig tree. To the costly and hazardous transportation and the fact that each man lives for the production of his own food there is the increment which represents the necessity of overcoming the inertia of the native. He has no ideals of the sort we know and live for. Wealth to him is the possession of comfort of a sort we would regard as miserable. Drink, gaudy attire, and long leisure to enjoy them, are in a way objects of veneration to many of the Indian inhabitants and, in a large measure, it is true that only for them and the sterner necessities born of the meagre years will be produced, even for pay, what another man is to consume.

It may, therefore, be said that in general the commerce of these towns is decidedly feeble; is carried on under great difficulties and tends toward no natural self-initiated improvement, but rather stagnation, because the products are, on the whole, not of a complementary nature. The interchange of products is only important under fortuitous or local conditions as when clay deposits occur at one locality and not at another, and so lead to the production of pottery; or where the culture of the grape is happily joined in one place to a good water-supply, and the production of exceptionally good wine thus becomes a tradition. At present there is also a certain activity due to the opening up of mines in the mountains. The surplus products of the oasis of Chaqarilla are disposed of at the Victoria mines, a few miles away, while some fruit and dried meats are taken from Pica and Matilla to the mines at Huataconda and Chaiahuasi, a week's journey over a steep trail.

The precarious situation of most of the towns is one of their strik-

ing characteristics. The least accident may betray them. This is well illustrated by the history of a line of settlements in the Chaqarilla Valley. It was at one time a fertile and frequently visited district. But in the early 70's, as nearly as we could determine, a great flood came down the gorge, broke down the irrigating ditches, cut up the terraces or deposited infertile sand, gravel, and even boulders upon them, overwhelmed orchards, and so generally devastated the farms and discouraged the inhabitants that all but a remnant of them moved away. Their irrigation works may still be seen at the site of the now deserted village of Algorrobal. Here and there a neglected orchard tree or pepper bush, struggling along as best it can without irrigation, or the crumbling mud walls of some abandoned home are a mournful testimony to the ruin wrought by the flood in this once happy valley.

The fragment of people now living within sight of the former more populous valley occupies a safer position. The tiny oasis of Chaqarilla is perched high above reach of flood upon the slopes of a terraced alluvial fan, whose outer edge is protected by a stone wall. The small spring-fed stream discharging across the fan is led out upon the gardens and orchards by half a hundred diverting canals. Before the mines were opened it was a lonely spot and it is said that it was once attacked by robbers from the pampa to the west. It was supposed that stores of treasure had been accumulated from the mysterious mountains behind them. Nothing, however, was found and the murder of most of the inhabitants was but a dismal butchery.

The future of these piedmont and mountain valley towns is safely predictable. The small area of irrigable land, even with the maximum conservation of water-supply, means definitely restricted groups of population widely separated from each other and as stagnant and self-dependent as isolated. Their limited development and the wide unproductive spaces to be overcome will always mean the absence of any improved means of communication and no assistance can be expected in this direction. Railroads will never connect these towns except as they lie by chance upon the line of some future route between mine and seaport. Pica is the largest town along the mountain front and a branch line but 14 miles long would put it in touch with the port of Iquique via the Lagunas-Iquique nitrate railroad. Yet that short line has not been built and probably will never be built. Consequently, the outlook for the smaller towns in remoter localities is that of a continuance of the present economic state unless fortuitously assisted by roads built to the mines or stimulated by the demands of nearby mines, the exceptional richness of whose ores will make possible the costly transportation by carts and mule packs.

to the coast. The latter means are not found generally successful today with competing mines more favourably located with respect to railroads. The mines back of Taltal, for a long time exporting their ores by cart to the seaboard, had to be abandoned when the mountain railroad from Antofagasta to Oruro was completed. The future of mining in this part of South America will be bound up with the future railroad development of the country now that railroad building has been actually begun. Before any railroads at all were built, or when



CROSS ERECTED UPON A "SIGNO DEL CAMINO," OR SIGN OF THE WAY.

The natives believe that it is a preventive of extreme drought in the valleys of the near-by streams.

only a few were completed, such competition could be continued. With the active extension of the railroads in South America, that phase of mining development has well nigh passed. The remote, isolated, self-dependent, desert village is therefore a permanent feature. The traveler of a century hence will still find certain groups

unaffected, in the main, by the industrial development of the mines and the nitrate deposits of the desert of Tarapacá.

In spite of the disagreeable odours and filthy sights one sees about these towns, one's first and last impression of them is enduringly pleasant. From the desert trail, long, hot, and deep in dust, their inviting gardens are seen many leagues away and at night a tower light on a commanding hilltop guides the traveler to their hospitable gates. Rows of refreshing orchard trees, neat squares of vegetable gardens, and a life-giving stream with clustering houses—that is the picture. In the twilight of morning and evening, the strong contrast of yellow plain and deep green foliage is most marked and lends to the view, in that otherwise cheerless land, an indescribable charm. There is a universal appeal in this aspect of home and a certain comfort and beauty amid the inhospitable surroundings of a naked desert.

Each town has its patron saint, appropriate to the specialty for which the town is known or the condition under which it exists. St. Andrew, the patron saint of wine, is the patron saint of Pica, where excellent wine is produced; San Isidro, the patron saint of farmers, is the patron saint of Canchones, where, without a surface stream, the farmers still persist in agriculture by digging canals and great holes to the ground water, and in these they plant their grain and vegetables. Frequently the saint of one village is taken on a trip to a neighbouring village. Thus, at the time of our visit to Pica the Virgin of Candelaria was brought from Macaya, a copper-producing village of 600 inhabitants, 60 miles northeast of Pica. She came asking for alms, for it had proved a hard year at Macaya and an appeal was thus made to the generosity of the inhabitants of Pica. Their patron saint was carried out to meet the visiting saint and with fife and drum the united procession returned to the village, parading the streets to the church of St. Andrew.

Throughout many portions of this thinly populated, arid region of South America, there is the most curiously interesting mixture of primitive and Christian worship. The old rites of the Indians are grafted upon a new principle, often with but a change in name and not in symbol. The spirit of the old prayers for abundant rivers and rich harvests breathes through the new devotions and the quaint, melancholy songs of the ancient Quichua or Aymara tribes often follow upon a fiesta in which the rites of the Christian religion are but new forms for an old and pathetically simple speech. The rivers and the harvests are the forms in which they understand the Deity. It is hard to teach men new faiths or religious or moral niceties whose first and only prayer has always been for the daily bread fairly wrung from a stubborn earth.

THE BRITISH ANTARCTIC EXPEDITION.

BY

EDWIN SWIFT BALCH.

The British Antarctic expedition under the command of Ernest H. Shackleton, which recently returned from the Antarctic, has achieved a most brilliant success, one of the greatest in Polar annals. Captain Shackleton was born in Ireland. He entered the British merchant service and was an officer of the Union Castle Line, when he was appointed one of the officers of the British National Antarctic expedition under Captain Scott. His portrait,* taken with the other members of the expedition, shows that he is a man of tremendous determination and will power, qualities which explain his achievement.

It is impossible as yet to say just how much Captain Shackleton has accomplished, as all the data so far at hand are a couple of meager cablegrams from the antipodes. Apparently, however, the following statements are approximately accurate.

The expedition started for East Antarctica in the sealer *Nimrod* during the antarctic summer of 1907-1908, and landed in McMurdo Sound near Cape Royds, in about 166° E. Long., $77^{\circ} 50'$ S. Lat. Here they wintered in a hut. They had with them an automobile, which, apparently, was a failure, and some ponies, that seem to have turned out even more useful than dogs. The expedition carried out two mainland journeys.

One party, consisting of Captain Shackleton and Messrs. Adams, Marshall and Wild, left Cape Royds in the beginning of November, 1908, returning there on March 4, 1909. They appear to have travelled southwards between the meridians of 162° and 172° East Long.; first over the surface of the Great Ice Barrier, until about S. Lat. $83^{\circ} 33'$. Here they discovered new mountain ranges trending south and southwest. Whether these barred the way south is not clear, but, at any rate, at this point the expedition ascended a great glacier and after this they remained at high altitudes, ascending at one place to 10,500 feet. On January 9, 1909, they reached $88^{\circ} 23'$ S. Lat., 162° E. Long., when they were 111 statute miles distant from the South Pole. At this spot they were on a plateau

* "The Voyage of the Discovery," Vol. I, p. 66.

where no mountains were visible, and only a plain was seen stretching to the south.

From the data furnished so far it is impossible to tell whether the end of the Great Ice Barrier was reached, or in what direction exactly South Victoria Land trends south of Mount Longstaff, or what becomes of the mountain ranges.

The other party, composed of Messrs. David, Marson and MacKay, left Cape Royds on Oct. 5, 1908, and were gone for 122 days. They pushed up to the main ice cap of East Antarctica somewhere near McMurdo Sound, and then travelled northward until they arrived at the South Magnetic Pole, in S. Lat. $72^{\circ} 25'$, 154° E. Long., or, from another cablegram, 146° E. Long. Whichever of these two positions may be correct, the northern party had there arrived at Wilkes Land, as the first of these positions is due south of and close to Hudson Land, and the other is due south of and not far from Case Land. This northern party, therefore, not only discovered the South Magnetic Pole, but it also proved the continuity of the ice cap extending from Wilkes Land to the later discovered South Victoria Land.

On the homeward voyage also, apparently, when in $69^{\circ} 48'$ S. Lat., $166^{\circ} 11'$ E. Long., that is a little northeast of Cape North, the expedition were able to see a mountainous coast extending for about forty-five miles west of Cape North, that is, in the direction of Hudson Land, another proof of the continuity of the coast of East Antarctica in this quarter.

In March, 1908, also, some members of the expedition made an ascent of Mount Erebus, reaching the summit, about 13,100 feet, on March 10. The crater, about half a mile in diameter and 800 feet deep, was ejecting great volumes of steam and sulphurous gas. There have been several previous mountain ascents in Antarctica; of Mount Gauss in King William II. Land, by Drygalski; and of Mount Abruzzi, 4,500 feet, in West Antarctica, by members of the Charcot expedition; but the ascent of Erebus is much the highest yet made.

Captain Shackleton and all the members of his party are much to be congratulated and admired for their splendid services to geography and terrestrial magnetism. They have not solved all the problems of Antarctica, but they have diminished the area of the unknown, by boring straight into the interior of the continent.

Is it not time for America to help in the scientific exploration of the continent whose existence was first made known to the world by Americans? Three years ago the Secretary of the Navy was ap-

proached to see whether a ship could not be sent to verify the discoveries of Lieutenant Charles Wilkes, U. S. N. But Mr. Truman H. Newberry turned down this request on the plea that there was no naval vessel then available for this work.

America has already allowed the Belgians, the Swedes, and the French, under de Gerlache, Dr. Nordenskjöld, and Dr. Charcot, to verify and examine scientifically all the lands discovered in early days in West Antarctica by American sealers. Dr. Charcot is now at work widening his former discoveries. Will America, in the same listless, indifferent spirit, permit other nations to verify the discoveries of our greatest Antarctic explorer, Charles Wilkes? It almost seems so. The Germans, under Dr. Drygalski, verified the existence of Termination Land. The British have now proved the existence of Hudson Land. America is doing nothing. One hundred thousand dollars would probably pay the bill for charting more carefully the coast of Wilkes Land. Half the officers of the United States Navy would probably volunteer at once for an Antarctic expedition. Either the Government or a private American ought before long to send one or two steam whalers to the Antarctic to keep up our reputation as sailors and explorers.

A GEOGRAPHICAL EXCURSION IN NORTHERN ITALY AND THE ALPS.

BY

H. F. CLELAND.

The unique experiment of conducting a geographical excursion in Europe, open to students of European and American Universities, was successfully tried by Professor W. M. Davis during June and July, 1908. The *personnel* of the party changed to some extent from time to time, geographers joining it for the study of a certain region and then leaving, perhaps to rejoin the excursion later. As a whole, however, the party changed little. The following are (from memory) the universities that were represented by students or professors for a few days, at least: Algiers, Berlin, Bern, Cambridge (England), Cincinnati, Lille, Lyons, Michigan, Grenoble, North Carolina, Vienna, Williams College.

The plan of study, as stated by Professor Davis, was to "treat [the physiographic problems] in accordance with the methods of

systematic physiography." "The method preferred involves the consideration of *structure, process, and stage*, that is, each district is to be regarded as a solid mass, made up of certain geological structures (composition and altitude of rocks), standing at a certain altitude with respect to base level, and advanced by certain erosional processes to a certain stage of physiographic development. Every element of form is thus to be systematically related to the structure of which it is the surface, to the process by which it has been carved, and to the stage of development in which it stands with respect to the whole sequence of stages through which it would pass in a complete and undisturbed cycle of erosion."*

The itinerary varied little from that announced in the preliminary circular sent out earlier in the winter.

After a brief study of the physiography in the vicinity of Rome, particularly the Alban Hills, with their crater lakes, and the ancient crater which is now occupied by Lake Bracciano, together with the topography of Rome itself, of which the "Seven Hills" are the result of normal stream erosion, the party began its work near Ancona, where the stage of dissection of the foothills and the non-glacial valleys of Faenza were studied.

A week was spent in and about the Florence Basin, which is remarkable not only because of its extent and fertility, but also because of its historical interest, in an attempt to determine, if possible, whether it was due to down warping or faulting. Although no definite conclusions were reached, the majority of the party inclined to the theory that it had been formed by faulting along the eastern margin. The party also spent one day in walking across the Apennines to study the stage of the dissection of this range.

Considerable time was spent on the coast of the Mediterranean, between Pisa and Genoa, in a study of coast forms and the agencies which are modifying them and in considering the evidence of recent down warping as compared with the land to the east.

Cases of river capture on the divide between the River Po and the Mediterranean streams, and the entrenched meanders of the Po, were noted on the journey north from Genoa to the Italian Lakes.

A somewhat detailed study was made of the magnificent examples of glacial erosion and deposits, such as over-deepened valleys, hanging valleys, roches moutonées, terminal moraines, and associated phenomena at Lake Como, Lake Maggiore, in the valley of the Ticino River and at Biasca, Ivrea, and Aosta.

* Preliminary announcement, entitled "Proposal for Geographical Field Study in Northern Italy and the Alps, June and July, 1908."

At Grenoble, France, the party was accompanied, at different times, by Professor Lory and Dr. Jacob of the University of Grenoble, and Professor de Martonne of the University of Lyons. With Grenoble as a centre, trips of from one to several days' duration were taken to the more striking or important examples of glacial and stream erosion and phenomena in that vicinity. Among the most interesting were examples of the diversion of streams from their wide pre-glacial valleys to their present deep, narrow, post-glacial gorges. In the valley leading from Le Bourg-d'Oisans to St. Christophe, landslide topography is abundant and well-developed and its close similarity to morainic topography is well shown; the most striking example being that of a lake of considerable extent formed by a barrier about 1,000 feet in height which was made by a post-glacial landslide.

A journey through the Grand Chartreuse was made to study the topography of a folded non-glaciated limestone region.

After a visit to the Cervennes of central France, where a well-developed peneplain is strongly trenched by streams, the party went to Le Puy in Auvergne, where are to be seen the unique forms which have resulted from the action of erosion upon igneous and pyroclastic rocks. Here the party disbanded, a part to go to Geneva to attend the Geographical Congress and the remainder to their homes.

The results of this extended excursion were, perhaps, no more valuable than a well-planned excursion of similar extent in our own country; but there were certain advantages, as, for example, an acquaintance with the geology and geography of a portion of another continent, and of certain regions which had been carefully worked out by eminent European geologists or geographers, as well as an acquaintance with European geographers and their methods of study.

Altogether, Professor Davis is to be congratulated upon this thoroughly successful outcome of his experiment.

THE FORTY-NINTH PARALLEL BOUNDARY LINE.

BY

G. W. LITTLEHALES.

Dr. Otto Klotz, Dominion Astronomer and Director of the Observatory at Ottawa, Can., has published, in the *Journal of the Royal Astronomical Society of Canada* (Dec., 1908), an interesting paper, entitled "The Forty-Ninth Parallel," in which he has stated the characteristics of the line resulting from the operations of demarca-

tion of the boundary between the United States and Canada, from Minnesota to the Pacific Coast. He gives an impression of the arduous and protracted labours of the astronomers and surveyors who have, from time to time during the last half century, represented the two governments in designating the location of this frontier.

Many persons have, doubtless, wondered how it happens that Minnesota extends apparently into Canada, north of the 49th parallel, in the region of the Lake of the Woods. This is explained by the Convention entered into on October 20, 1818, between the United States and Great Britain, which says:

"It is agreed that a line drawn from the most northwesterly point of the Lake of the Woods, along the forty-ninth parallel of north latitude, or, if the said point shall not be in the forty-ninth parallel of north latitude, then that a line drawn from the said point due north or south, as the case may be, until the said line shall intersect the said parallel of north latitude, and from the point of such intersection due west along and with the said parallel, shall be the line of demarcation between the territories of the United States and those of His Britannic Majesty, and that the said line shall form the northern boundary of the said territories of the United States, and the southern boundary of the territories of His Britannic Majesty, from the Lake of the Woods to the Stony Mountains" [Rocky Mountains].

This line is 860 miles long.

For the extension of this boundary from the Rocky Mountains to the Pacific Ocean, it is provided in Article I of the Treaty concluded at Washington on June 15, 1846, between the United States and Great Britain, that from the point on the

"forty-ninth parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, the line of boundary between the territories of the United States and those of Her Britannic Majesty shall be continued westward, along said forty-ninth parallel of north latitude, to the middle of the channel which separates the continent from Vancouver's Island, and thence southerly through the middle of the said channel, and of Fuca's Straits, to the Pacific Ocean."

This line is 410 miles long, making a total of 1,270 miles along the 49th parallel.

Boundaries which are defined, like this one, by a parallel of latitude or a meridian of longitude, are known as astronomical frontiers in contradistinction to natural frontiers, such as mountain ranges or the shore of the ocean, and to those frontiers which are defined by some existing artificial feature or condition. While the astronomical frontier is capable of brief and precise description in a treaty, in a manner that will leave no doubt as to the meaning of the parties to the agreement, it has no local or topographical value until it is marked out upon the ground.

Since the agreement was that the boundary should be a parallel of latitude, it became necessary for the astronomers engaged in the demarcation to define what should be the meaning of the term latitude as used in the treaties. The astronomical latitude of a place has been defined as the declination of its zenith, or the angle between

the plane of the equator and the direction of gravity at that place, however, that direction may be affected by local causes. The geocentric latitude, on the other hand, is the angle made at the centre of the earth between the plane of the equator and a line drawn from the observer to the centre of the earth, which line does not coincide with the direction of gravity since the earth is not spherical but ellipsoidal in form. The geographical or geodetic latitude of a station is the angle formed with the plane of the equator by a line drawn from the station perpendicular to the surface which the deductions of geodesists have assigned as the closest approximation of a mathematical figure to the form and size of the surface of the earth.

The astronomical and geographical latitudes do not differ much, and would evidently not differ at all if there were no local variations of gravity and if the mathematical figure assigned by geodesists were the actual form and size of the earth; but the geocentric latitude, which is used principally in certain astronomical calculations in which parallax is involved, differs from the others by a comparatively large amount.

For the determination of geocentric and of geographical or geodetic latitudes, the form and dimensions of the earth must be known, but the astronomical latitude is capable of determination directly from latitude observations. It was this property of the astronomical latitude that influenced the Commission, which was appointed to carry out the stipulations of the treaty, in deciding that the boundary to be traced between Minnesota and the Rocky Mountains should be a line connecting stations at each of which the direction of the force of gravity should make an angle of 49° with the plane of the equator. The effects of the irregular distribution of matter, both in the visible arrangement of the surface forms of the earth and in the varying densities of the materials below its crust, in altering the direction of gravity, are by no means insensible as compared with the accuracy of modern astronomical observations; but to have satisfied the condition that the sum of the differences of the astronomical and geodetic latitudes should be zero, and thus to have made the line of demarcation a mean parallel, would have entailed a revision of the whole work after the location of the astronomical stations and the completion of the triangulation between them.

The boundary traced upon the surface of the earth thus came to be an irregular curve known as an astronomical parallel of latitude. The recommendation for this, by the chief astronomers of the Commission, was based upon the following grounds: 1st, that the portion of the 49th degree parallel of latitude included within the

operations of the Commission, being only about one-twentieth part of the entire circle of latitude, was not sufficient to fix, with mathematical accuracy, the true position of the mean parallel of 49° , and that, therefore, if such a parallel were described, depending upon the mean of the astronomical stations, no known point of the boundary would be in latitude 49° ; 2nd, that as the amplitude of the arcs, included between the mean and astronomical parallels, would, in many cases, be very considerable, grave errors and complications might arise in the subsequent resurvey of any lost portion of the boundary; 3rd, that the definition of a mean line would involve a readjustment of the whole boundary, after the first careful survey was completed, and consequently a very considerable increase of expense without any corresponding practical benefit; 4th, that for every purpose, except that of geodetic computation, a parallel of points determined astronomically is a true parallel of latitude, and, therefore, fulfills the stipulations of the treaty.

The International Commission of 1872 established 40 astronomical stations at approximately equal intervals throughout the distance of 860 miles from the Lake of the Woods to the Rocky Mountains, and these, together with the 28 stations established by the earlier commission of 1857 along the stretch of 410 miles passing from the Rocky Mountains to the Pacific coast, have served as the basis for the tracing of the boundary line, although all of the extent of this frontier was not surveyed to form a connection between the boundary stations until the recent International Commission was organized for the purpose of completing and re-monumenting it.

For the part of the boundary east of the Rocky Mountains it was agreed that the line joining any two adjacent monuments should be an arc of the parallel of latitude; but, with reference to the western part, a different settlement had been reached between the earlier commissioners by which the connecting line between monuments should be a geodetic line or an arc of a great circle of the terrestrial spheroid. At each of the governing astronomical stations prime vertical circles were laid off upon the ground, and, from the line so traced, the calculated offsets to the small circle of latitude or to the geodesic line, as the case might be, were measured at convenient intervals. Wherever there was a relative deflection of the plumb line between two adjacent astronomical stations, the arcs of the boundary, thus traced with reference to the stations, would not meet, and the divergence was distributed between the two related boundary stations in such a manner as to bring about a closure between the successive parts of the boundary line.

BRAZIL'S FAILURE TO CONTROL THE PRICE OF COFFEE.

The scheme of three coffee States of Brazil to effect a virtual corner in the coffee product of the world, maintain prices at a desired level, and restrict production, is now chiefly history. The initiation of the plan, its workings, and the final and recent abandonment of it, are among the interesting items of current economic geography.

Brazil's leading coffee production was the geographic basis of the scheme. About three-fourths of the world's commercial coffee is grown in Brazil. Central America, the nearest competitor, produces annually only about one-eighth as much and the coffee of the East Indies and Java together amounts only to some hundreds of thousands of bags. Brazil's coffee lands occupy a uniquely favoured position. They are near the sea and on the best watered portion of the Brazilian highland, the windward, southeastern slopes that receive the rainfall of the trades. The soil is likewise favourable through deep decay in a humid, tropic location and seems not to be depleted by continued production. Soil and climate and cheap transportation are therefore combined in a seashore belt where most of the population resides and these convergent factors have made Brazil the world's chief coffee producer.

The economic basis of the scheme was the theory that by computing the world's average consumption during preceding years, the yearly demand might be estimated, and by producing only enough coffee to supply this average demand a fair price might be fixed and maintained. The crop, like all others, is subject to certain uncontrollable fluctuations in amount, and it was a further point in the theory that, in years of natural overproduction, the surplus coffee, instead of being thrown upon the market to the common loss of all producers through declining prices, should be stored, to be sold out later when years of smaller production ensued. The enduring quality of the coffee berry, enabling its storage in warehouses for many months, gave further strength to these possibilities.

Such a scheme, involving the control of millions of dollars worth of coffee, meant that production would advance rapidly, for a fixed price was practically guaranteed by the State governments. To offset this tendency a law was enforced which prohibited the free extension of coffee culture. Only the estates already established were to produce coffee.

The State chiefly concerned in the attempt was São Paulo, which produces about two-thirds of the total crop of Brazil. Even there, not more than one-half of the available land is devoted to coffee culture. Rio and Bahia are the other coffee centres. The three principal coffee producing States entered into an agreement whereby each assumed an equitable share of the responsibility of purchasing enough surplus coffee to fix the market value at a figure remunerative to the planters. Further terms of the agreement involved the borrowing of large sums of money with which to carry the surplus until it could be profitably marketed. Elaborate estimates were made of the possibilities of the scheme. A vigorous propaganda was inaugurated for increasing the consumption of coffee abroad and the promoters were most enthusiastic over the outcome. The attention of the world was drawn to the plan because of its unique financial and economic features.

The whole scheme is now being abandoned. It was found that while the planting of new coffee estates was forbidden, old owners replanted their fields or threw their whole strength into their improvement by better methods of cultivation. The result was a phenomenal increase in production. The total crop of Brazil for 1906-1907 had already risen to about 85% of the world's production, and, under the stimulus of the actually working scheme to control the market, the production of 1907-08 increased likewise, and coffee interests and government interests alike were on the verge of panic. The State of São Paulo had arranged a loan of \$5,000,000 in treasury bills, payable in one year, and consignments of coffee to European and American ports were negotiated with the principal coffee houses. Later the government operations were extended and another loan of \$15,000,000 was contracted. The amount was to be repaid in five years and the interest rate was to be 5% per annum. The loan was secured by a surtax of 58 cents on each bag stored. Coffee buying began in August, 1906, and in 1907 purchases were continued up to nearly 8,000,000 bags. The value of this stored coffee was about \$65,500,000 at the average market price in New York for the week ending July 24, 1907.

It is reported (*Daily Consular & Trade Report* No. 3321) that the present state of the scheme is one of collapse. The Government of São Paulo is securing a loan of nearly \$75,000,000 for the consolidation of the previous loans and the general indebtedness arising from the execution of the scheme. It is asserted that American, German, and English financiers will take two-thirds of the loan and French financiers the other third. One of the requirements of the

contract is that the Government shall go out of the coffee business entirely and that it shall give up all propaganda and other enterprises, as far as present contracts permit, and that it shall make no attempts in the future to control the coffee market by artificial arrangements.

The new law authorizing the \$75,000,000 loan also increases the surtax, but makes it payable only on coffee exported in excess of 9,000,000 bags in 1909; 9,500,000 in 1910; and 10,000,000 annually thereafter. This practical limitation of the coffee exported ties up great quantities of it in the port of Santos. The charges on the coffee thus stored already aggregate about \$100,000. To add to the difficulty there has been a strike of the dock labourers at Santos, which has prevented the entry and shipment of the usual amounts of coffee.

CORRESPONDENCE.

THE PART OF THE NILE WHICH COLONEL CHAILLÉ-LONG DISCOVERED.*

WASHINGTON, D. C., March 1st, 1909.

The Journal of the Royal Geographical Society for February contains a paper read Dec. 15, 1908, before that society by Sir William Garstin, entitled "Fifty Years of Nile Exploration," on the occasion of the Jubilee of Speke's discovery of the Victoria Nyanza.

Sir William Garstin mentions my exploration in a paragraph † which may be intelligible, perhaps, to geographers, but it is obscure to the layman and the historian unacquainted with Nile exploration. There is no connection, in Sir William Garstin's brief note, of my discoveries with those of Speke and Baker. They are disconnected by several pages, as if there was no connection. Stanley did not precede me in the Nile Basin, but succeeded me.

My explorations are inseparable from those of Speke and Baker which they supplement and complete; and to be intelligible to the reader, a notice of my work should follow immediately that of Sir Samuel Baker.

It is confessed by Sir William Garstin that Speke, driven from his attempted exploration of the Victoria Nile, left an avowed blank in the Nile source problem. Sir Samuel Baker next discovered the Albert Nyanza, but he also was driven from Ugoro and, consequently, never reached the Victoria Nile.

It is confessed by all geographers that when General Gordon succeeded Sir Samuel Baker as Governor-General of the Egyptian Equatorial Province, the blank in the Nile, from Urondogani on the Victoria Nile to Mruli and Foweira to Lake Albert,

* This letter, received from Colonel Chaillé-Long, is a concise recapitulation of facts that are a part of history. They are again printed in the BULLETIN because it is desired to reiterate the notable service of Colonel Chaillé-Long as the pioneer discoverer of a part of the Upper Nile and in the belief that his just title to be known for the work he did, should, in no way, be obscured.

† "In 1874 Colonel Chaillé-Long explored the Victoria Nile and proved beyond all question that the river which entered the Albert Nyanza at Magungo was that which issued from Speke's Lake at the Ripon Falls. Colonel Long was also the discoverer of the reedy lakes known as Choga and Kwania, called by him Lake Ibrahim," p. 130.

left the Nile source problem still unsolved. The Nile, indeed, according to some geographers, flowed eastward from the Victoria Nile.

American officer, Lieut.-Colonel of the General staff of the Egyption army since 1869, I was appointed chief of staff to Colonel Gordon, Feb. 19, 1874, and charged by Ismail Khédive with a secret mission—to make a treaty with Mtesa, King of Uganda. I left Gondokoro accompanied by two soldiers, two servants and native porters, April 20, 1874, and arrived at the capital of Uganda, June 19, 1874. I visited the Lake Victoria, July 14, and, returning to the capital, executed the treaty between the Khédive and the King, July 19. On July 28, I regained the Nile, reached Urondogani, August 5, descended the river in two bark canoes, and discovered, August 11, a lake to which I gave the name of Hussein (after Prince Hussein, Minister of War), but to which the Khédive subsequently gave the name of *Ibrahim* in honour of his father, the "hero of Nezib."

The navigation of the Victoria Nile and the discovery of Lake Ibrahim completed Speke's discovery of the Victoria Nyanza and finally solved the Nile source problem. I claim, therefore, with Speke and Baker the part attributed to me by General Gordon.

It is a part of the history of this mission confided to Chaillé-Long by the Khédive to state that, because of its success, Chaillé-Long was mentioned in General Orders to the army. Dr. Schweinfurth, the distinguished African traveller, President of the Société Khédiviale de Géographie, of Cairo, introducing the discoverer, returned to Cairo, at a dance held in his honour, said:

"The voyage of Colonel Long Bey has a marked place in the front rank of the grand and glorious voyages to Central Africa. The proofs of courage, constancy and temerity manifested by him are unique in the history of discovery."

The name of "Cojae" was first substituted for Ibrahim in 1879 by Gen. Gordon, to whom I addressed a note asking him if he did not think that such a change was unjust both to the Khédive and myself. Gordon, then at Massowa, Abyssinia, replied promptly:

MASSOWA, Dec. 9, 1879.

"DEAR CHAILLÉ-LONG: I received your letter (Oct.) to-day on my arrival from Abyssia. You are very much mistaken if you think I wished to detract from the just merit due to you for your passage from Urondogani to Mruli by calling the lake after the name given by the natives. * * * The map was put together when I was in the Soudan, and had I known that you would have wished the name given the lake to be inserted it would have been so thus: Lake Cojae, alias Lake Ibrahim.

"Believe me, Yours very truly,

"C. G. GORDON."

Gordon's letter, published in the N. Y. *Herald*, Jan 23, 1880, says in part:

"Col. Chaillé-Long of the Egyptian Staff passed down the Victoria Nile from Nyamyongo where Speke was stopped, to Mruli; thus, at the risk of his life, settling the question before unsolved of the identity of the river above Urondogani with that below Mruli.

Those who care to study the successive steps which built up the map of the course of the Nile will know that to Speke is due the discovery of one portion, to Baker that of another, and to Chaillé-Long that of another portion, and of the lake alluded to.

C. G. GORDON."

Gordon, it will be remarked, claimed that the *native* name of the lake was Cojae. Subsequent travellers found other native names and substituted them according to fancy: "Gita Nzige," "Quania," "Choga," etc. In June, 1901, I appealed to Gen. Bassot, Sub-Director of the General Staff and of the Geographical service of the French army, and received the following reply:

"There is, for a fact, identity between Lake Ibrahim and the lake traced by Macdonald in 1897, and named by him *Choga*. Besides, all the lakes of this region have retained the European names with which their discoverers have baptised them (Victoria, Albert, Rodolphe, etc.). There is not, therefore, any reason not to maintain that of Lake Ibrahim, and the name will be again adopted for subsequent editions of sheet No. 30 of the Map of Africa."

The names Victoria and Albert Nyanza, given these lakes by their British discoverers to mark a British enterprise, constitute reasons why Ibrahim should be maintained to mark an Egyptian enterprise.

I submit that the foregoing facts, which have been set forth *in extenso* in the BULLETIN of the American Geographical Society for January and June, 1904, and January, 1908, constitute for me a place in the history of Nile exploration as having completed the discoveries of Speke and Baker, having followed immediately that of Baker.

CH. CHAILLÉ-LONG,
Corresponding Member.

GEOGRAPHICAL RECORD.

NORTH AMERICA.

THE NATIONAL FORESTS.—The regions recently declared, by proclamation of the President, to be set aside as forest reserves, are the Ocala National Forest in Marion County, eastern Florida (the first created east of the Mississippi River), and the Dakota National Forest in Billings Co., N. D. Thus, two more States are added to the list of those wherein land will be put under scientific forest administration. There are now nineteen States and the Territory of Alaska having national forests. The Florida Forest has an area of 201,480 acres, of which about one-fourth has been taken up under various land laws. It covers a plateau between the St. John's and Ochlawaha rivers, and at no point is the elevation over 150 feet above sea-level. The new Dakota National Forest, consisting of 14,080 acres in the Bad Lands region, is important, for it means that an experimental field for forest planting has been secured in North Dakota, the least-forested State in the Union, having only 1 per cent. of tree growth. The Forest Service expects to establish forest nurseries, with the hope that, in time, the area may be reforested by artificial means. Before the creation of the Ocala National Forest in Florida, the Ozark and the Arkansas, in Arkansas, were the most eastern national forests. Practically all the other national forests are in the Rocky Mountain and Pacific Coast States.

CARIBOU ON QUEEN CHARLOTTE ISLANDS.—The *Ottawa Naturalist* for March says that the long-debated question as to the existence of caribou on the Queen Charlotte Islands has been settled in the affirmative. It seemed improbable that such large and active animals could have existed unseen in an area comparatively so small. However, they are there, and Indians recently killed three of them which they discovered in the interior of Graham Island. They presumably belong to the species known as *Rangifer dawsoni*. In view of this discovery, the Government of British Columbia has prohibited the hunting, killing or capture of caribou on these islands.

THE CHARTING OF NORTHERN LABRADOR.—The survey and charting of Northern Labrador, last summer, under the personal direction of Sir William McGregor, Governor of Newfoundland, and Dr. William T. Grenfell, of the Labrador Mission field, were most important, for they covered a region that has, hitherto, been

practically unknown. The survey embraces all that portion of the peninsula lying north of Port Manvers, in latitude 57° N., not far from which is the Moravian Mission of Okkak and a station of the Grenfell Missionary Association on the outlying island of St. Paul.

Gov. McGregor says that the scenery of this region is unsurpassed, and that it must eventually become as much an objective point of summer travel as the North Cape of Norway. The peninsula is found also to be an undeveloped mineral asset of great value, "unrivalled for geological and prospective work, having an important mineralogical future." Added to the sealing, fishing and fur industries, the newly found mineral resources will give the region much importance.

There are excellent harbours all the way along the coast and no coastal waters will be easier to navigate, after the hydrographic maps are published, than those from Cape Mugford to Cape Chidley at the north end of the peninsula. Eclipse Harbour, south of Cape Chidley, was so named from the scientific party that made it the observation point of the annual solar eclipse of 1860.

The Governor and Dr. Grenfell hope to have the hydrographic work completed by next September. Already this coast presents a scene of considerable activity. Last summer fifty-nine schooners were counted at one time, and saw-mills, fishing stations, trading posts, and the monthly mail boat enliven the shores.

C. H.

A NEW CAMEL FROM THE LOWER MIocene OF NEBRASKA.—In the autumn of 1906, Harold James Cook found a nearly complete skeleton of a camel, in the Lower Harrison Beds, near Agate, Sioux Co., Neb. The skeleton is finely preserved and articulated. It had apparently been washed into a heap while the muscles still held the bones together, for it is literally tied in knots. On this account it has only been partly removed from the matrix, and so a complete description is deferred.—*Amer. Naturalist*, Lancaster, Pa., March, 1909.

THE COAST AND GEODETIC SURVEY.—The Annual Report, July 1, 1907, to June 30, 1908, covers 169 pages with nine maps in pocket. An important feature of the year's work was the completion of the reconnaissance for the extension of the primary triangulation from the 98th meridian in central Texas across New Mexico, Arizona, and California to the triangulation of the same class extending along the Pacific Coast across California, Oregon, and Washington. It extends along an arc of the parallel for about 1,200 miles, and the work was begun and completed during the year. This triangulation, when completed, will connect with the international boundary between the United States and Mexico in many places, and will make it possible to replace this boundary exactly in position, even though the monuments which now mark it were destroyed.

The completion of the triangulation along the 98th meridian was also an interesting feature. This triangulation now extends across the country from Canada to Mexico, supplying numerous geographic positions in Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. It is also an important meridional arc which this country contributes to the International Geodetic Association for the study of the figure of the earth. The Mexican Government is extending this arc in Mexico, and Canada, also, has begun a geodetic survey as a permanent basis for all future geographic and economic surveys in which great accuracy is desirable.

The triangulation which is being extended along the 141st meridian, the boundary between Alaska and Canada, will supply geographic positions from Mount St. Elias to the Arctic Ocean that can be used for all future surveys which the economic development of the region may demand. Details of the progress of magnetic, hydrographic, and topographic surveys are given. (See New Maps.)

STATE GEOLOGICAL SURVEYS.—The *Reports* of the Geological Survey of North Dakota are issued biennially. The next to appear will be the volume for 1907-08, the fifth in the series. Among the investigations reported upon in the published volumes are: Vol. 2—Lignite resources of the State, especially important in view of the practical non-existence of forests in North Dakota. A series of papers on this subject give the results of preliminary studies by Dr. Frank A. Wilder and Mr. L. H. Wood. Dr. Wilder, also writing on irrigation, said that throughout the western part of North Dakota, lignite would afford a cheap and abundant fuel for irrigation purposes. Vol. 3—Dr. Wilder reported that the possibility of irrigating considerable tracts along the Missouri and its tributaries, using lignite as fuel, appeared most encouraging. Prof. A. G. Leonard, who succeeded Dr. Wilder as State Geologist, in the summer of 1903, reported on the topographic features and geological formations of the State, and Prof. E. F. Chandler treated "Stream Measurement and Run-off of Streams in North Dakota." Vol. 4—The Fourth Biennial Report was devoted to the clays of the State and their economic importance. The State Geologist urged that the topographic survey should be pushed more rapidly by State co-operation with the Federal Survey. All the *Reports* are copiously illustrated with half-tones and maps.

The Oklahoma Geological Survey was established by the first Legislature of the State in 1908. Circular 1 describes its origin, scope and purpose. It is under the direction of the State Geological Commission, composed of the Governor, the President of the State University, and the State Superintendent of Public Instruction. Its purpose is to study the geological formations, with special reference to the economic resources, to prepare bulletins and maps, and to make a biennial *Report*. Materials collected are to be deposited in the State Museum, duplicates to be distributed among State schools. The offices of the Survey are in the State University. Professor Charles N. Gould is Director of the Survey and Mr. L. L. Hutchison Assistant Director. Preliminary reports on the building stone, oil and gas resources and road material of the State and on the economic products of the Arbuckle Mountains will, it is expected, be published at an early day. While Oklahoma has mineral resources in great variety and abundance, very little of this wealth, as yet, is being developed.

The Geological Survey of Georgia has issued, as *Bulletin 18* (453 pp.), the report of Assistant State Geologist Otto Veach on the clay deposits of the State. The first report in 1898 was confined to the Cretaceous clays along the Fall Line, but the present report includes both the Fall Line clays and those of all parts of the State. High grade kaolins and fire clays occur in great abundance. The volume has many half-tones and maps.

The Geological Survey of Louisiana has published a report on "Rock Salt" (*Bull. 7, Report of 1907*, 259 pp., plates, figures and maps), by G. D. Harris, C. J. Maury and L. Reinecke. Rock salt is treated in its origin, geological occurrences, and economic importance in the State, and all known salt deposits and industries of the world are briefly referred to.

REPORT OF THE MISSISSIPPI RIVER COMMISSION FOR THE YEAR ENDING JUNE 30, 1908.—The work of the Commission is stated under five headings, and these serve somewhat as an index of the contents:

1. Continuation of surveys; preparation and publication of maps; maintenance of gauges; the recording, tabulation, and publication of gauge readings; the taking and recording of discharge measurements at high and low stages of the Mississippi River and its tributaries, and other observations.

Every high-water season has its characteristic feature. During the year covered by this report, the duration of the high stages in the lower river was excessive. Four crests were recorded at Cairo, occurring on Feb. 26, March 18, April 13 and May 19, with a stage about 6.6 feet lower than the highest recorded at that station. The first three rises merged into one before New Orleans was reached and caused a prolonged period of high water. The water stood above the 15-foot stage (Carrollton gauge) for over 100 days. This record has not been exceeded, and the nearest approach to it was during 1903, when the river maintained itself above that stage for 85 days. At Cairo, 40-foot stages or more were recorded for 77 days. This record was exceeded during 1882, when the river was above the 40-foot stage for 105 days.

2. The building, extension and repair of levees.

One and a half per cent. of the contents of the levees were lost by caving or other causes during the year, but the net gain was $4\frac{1}{2}$ per cent. This makes, as near as it is possible to estimate it, the levees about 81 per cent. completed.

3. The building, maintenance and operation of dredge boats.

The maintenance of a channel depth of 9 feet with a width of 250 feet was, in comparison with the work of previous years, a relatively easy task during the low-water season as the river did not fall to a low stage.

A new project included experimental dredging operations at three points (Linda, Island 35 and Corona Crossings), in order to test the possibility of maintaining a 14-foot navigable channel. At the Linda and the Island 35 crossings, the depth was maintained; but the experiment was not so successful at Corona crossing. The Commission reports that the difficulty here could have been avoided by the choice of another channel. It is to be noted, however, that the river did not fall as low as is generally the case during the season of experimentation.

4. The repair and extension of existing works for the improvement of the channel, the preservation of harbours, the prevention of cut-offs, and the security of levees.

The Commission is urging an increased appropriation for revetments. This call for revetments is a new stage of the work which is necessitated by the near completion of the levee system. The earlier policy, before the levees had reached such dimensions, when caving threatened the destruction of the levee, was to abandon the structure and to build loops or new lines farther away from the river. The greater size of the present levees makes such a policy expensive, and the Commission now insists that the only economical way to maintain the levee system is to hold the banks against caving. It is pointed out, furthermore, that the caving at New Orleans is a serious menace to the growth of that city as a seaport, and that the protection of the banks at this place against slipping and the assurance of a stable front for docking privileges demand a larger portion of the appropriation than has formerly been allotted to this work.

5. The maintenance of a low-water channel between the Mississippi, Red and Atchafalaya rivers. The report has a number of interesting plates. In addition to the hydrograph, there is added a profile of the high water of 1907, together with the profiles of the 1903 and 1906 crests for comparison, and sixteen plates showing in profile the top of the levees and the high-water slope for June, 1908, with the location of levees and revetments.

R. M. B.

SOUTH AMERICA.

SURVEY WORK ON THE FRONTIER BETWEEN BOLIVIA AND BRAZIL.—The pioneer service of boundary commissions in new countries is again brilliantly illustrated by the fascinating but brief account of really heroic explorations by Major P. H. Fawcett (*Geog. Jour.*, Vol. 33, 1909, pp. 181-185). He was appointed Chief Bolivian Commissioner to resurvey the Bolivian frontier as determined by the treaty of Acre in 1903. The work involved the determination of the position of the Acre River with respect to parallel 11° S. The sources of the Iquiry and Rapiirran were determined, the Alto Acre ascended, and the Abuna navigated in a small boat to its confluence with the Madeira. One gains from the brief account a very clear picture of the appalling difficulties of exploration and development in many sections of South America. The whole region explored by Major Fawcett is inundated every year and villainously unhealthy. The man-eating anaconda, the jaguar, Brazilian criminals, the whole list of tropical fevers and beri-beri are a few of the scourges of the Acre and Abuna region; while savages range the forests west of the confluence of the Yaveriça, near which rubber exploitation ends. As a result of the explorations, Brazil is willing to accept the Alto Acre as the frontier line from Bahia directly west to the source of the Rapiirran, and east down the Abuna. "The Iquiry disappears from the treaty, its position having been misunderstood. A joint commission will put up the frontier marks probably in 1911."

The second part of Major Fawcett's work was the boundary exploration on the Paraguay and the discovery of the true source and course of the mysterious Verde, that tributary of the Guaporé which has baffled the efforts of five government commissions. So hazardous was the latter exploration considered that the Brazilian Commission declined to supply a representative. Civilization ends completely at Matto Grosso, where a horrible disease called "corupcion" ends that long list of infirmities which make this section probably the unhealthiest in the world. Anthropophagous savages abound within gunshot of the old city. For two months the party was without food (or even salt), save for chunta nuts and the heart of the palmetto palm. Three out of six peons died and all of the dogs succumbed. The deep 300 ft. gorges, cut in sandstone hills, made the ascent of the Verde from its junction with the Guaporé extraordinarily difficult for a famished party. Hostile savages made necessary a double sentry every night. The system of slavery in the rubber districts, called peonage for politeness sake, and the raids upon formerly peaceful tribes to which it has led, have aroused bitter hostility among the Indians whose friendship should have been especially fostered in that singularly labourless land.

I. B.

ECUADORIAN EXPORTS.—The specialization of certain South American countries, engaged in almost purely extractive industries, is well illustrated by the list of

exports for 1908 from Ecuador *via* the port of Guayaquil, practically the sole port of entry for that country (*Daily Com. and Trade Rep't*, No. 3414). The exports of cacao amounted approximately to 64,000,000 pounds, valued at \$6,400,000, beside which all other exports are almost insignificant: hides, \$135,000; coffee, \$273,000; vegetable ivory, \$102,000; rubber, \$235,000. The value ratio of cacao to the rest of the list is thus seen to be nearly 1 to 8. It will be of interest to see how the relative as well as the absolute values will be affected by the railroad recently completed to Quito on the interior tableland.

I. B.

BRAZILIAN LIVESTOCK.—The United States and northern Europe supply the largest share of the improved breeds of imported livestock in Brazil. The disadvantages of such importation (*Daily Com. and Trade Rep't*, No. 3420), are the change to the shorter, coarser grasses and the inferior water supply. The change from these northern countries to Argentina is, however, less radical, the animals become acclimated more readily, and are then, in turn, quickly acclimated to Brazilian conditions. Argentina and Uruguay, therefore, supply notable quantities of such re-exported and partly acclimated stock. The yak breeds of native Indian cattle are imported from India and adapt themselves quickly to the climate of Brazil, which is similar to that of their native land.

I. B.

MINERAL WEALTH OF COLOMBIA.—The mineral wealth of Colombia is perhaps more varied than that of any other country of South America: gold (the principal mineral wealth), immense petroleum districts, coal in great quantities, iron, copper, lead, tin, asphalt, salt, arsenic and platinum are the most important on the long list. The total production of gold since the Conquest (up to 1890), is estimated at \$688,000 (*Daily Com. and Trade Rep't*, No. 3414). More than two-thirds of this amount was from placers, the rest from quartz mines. Scarcely a rivulet of the province of Antioquia, by far the richest gold province of Colombia, is without gold-bearing gravels, so extensively are the mountains crossed by veins of gold-bearing quartz. The entire Cauca Valley has been a never-failing source of support to the poorer classes, who make a regular industry of washing and rewashing the auriferous sands after the yearly freshets, a process carried on for generations. Wing dams are built on the river bends, the inclosure is pumped out and the sand excavated and washed. Single excavations have yielded \$20,000 and over during a single season. The most serious drawback to mining, as to other development, is the lack of adequate transportation facilities, especially felt in mining on a large scale, where heavy machinery is required. Freights are excessive, whether by river or rail, or by mule caravan. I. B.

THE RIVER PARANÁ: AN ECONOMIC SURVEY.—This is the title of an authoritative paper by W. S. Barclay (*Geog. Jour.*, Vol. 33, No. 1, 1909). This chief affluent of the River Plate is subject to sweeping changes of position in time of flood, though it is of great economic importance for transportation in this South American "Mesopotamia." Its own floods are greatly augmented by those of the Paraguay, which come down at the rate of 3 knots an hour, are 20 feet deep and 20 miles wide, and run over an alluvial bottom as wide as the English Channel. The course of the Paraná is from within a few miles of the coast of Brazil westward toward the interior for several hundred miles and finally southward to the

Plate. It thus, like the Uruguay, describes a great arc with the seacoast as a chord. The downstream course is broken by the famous falls of the Iguazú, 3,300 yards in length. Of even greater interest are the Guayrá Falls, above those of the Iguazú in the same system, where the total fall, including cascades, is 310 ft., with the gorge walls at one place but 200 ft. apart; and a volume of water reckoned at 13,000,000 cubic feet per minute, an amount which must be doubled or trebled in time of flood. It is one of the most compact water-power centres awaiting development.

The inundations of these rivers are inconceivably extensive. The Paraguay, on May 25, 1905, rose 12 ft. at Asuncion and inundated the Gran Chaco far and wide. At the mouth of the Iguazú, the Paraná rose 146 ft. and so dammed up the waters of the former that during five days its gorge filled to 210 ft., the cascades became flush and disappeared; and the river overflowed in all directions to the Paraná through the surrounding forest, a distance of $7\frac{1}{2}$ miles.

The main dependence of the Indian river tribes is upon fish, apart from wild honey, berries, and a few nuts. The fish are difficult to catch in time of flood, and impossible to preserve owing to the absence of salt. On the frontier of Entre Ríos are beds of gypsum, 2,000 tons monthly being shipped for plaster to Buenos Aires from La Paz. Better communication with the Paraná Valley from the coast, upon which the development of the region so intimately depends, may be accomplished by rail from the steep Brazilian coast or by shallow-draught river steamers. A 31-mile railroad around the Guayrá cataracts with 3-6 ft. lines of steamers would bring the great forestal wealth of the region to Buenos Aires. At present the 50,000 settlers in the pine forests back of the coastal plateau are commercially entombed. The widely inundated valley flats have a definite grazing value if they have a definite slope. The higher portions are grassed and these constitute about one-half the inundated area. The unoccupied savannahs in Matto Grosso and Goyez alone are as large as Texas. Their development would bring corresponding development to the forested areas above them. The jerked beef and extract factories are outbid by the frozen-meat establishments which have recently raised prices on good stock. The free grazing interests or squatters with poorer cattle are, therefore, driven north by the growing exclusiveness of and development by the real owners. This new, strong current of colonization toward central Brazil is one of the most interesting migrations of our day, both as to its cause and its developmental effects in the tropic and sub-tropic interior of Entre Ríos, Corrientes, Gran Chaco, and Matto Grosso.

L. B.

WHALING IN THE SOUTH ATLANTIC.—Late in the last century, efforts to revive the whaleries in the far South Atlantic, which had been abandoned for many years, failed completely because the Dundee and Norwegian interests, that sent out exploring parties, did not succeed in finding whales in sufficient number to warrant a revival of the enterprise. It was discovered, however, by Captain Larsen, Commander of the steamer *Antarctic* of the Nordenskjöld Antarctic expedition (1901-3), that there were whaling grounds of much promise in the waters far and wide around the large island of South Georgia. As a result of this discovery, the "Compania Argentina de Pesca" was, in 1903, organized at Buenos Aires with ample capital, and Captain Larsen was placed in charge of the company's whaling enterprises.

This company has built a station on South Georgia, including 17 buildings, and keeps there, in summer, 160 men who try out and prepare the oil for market, the dead whales being towed to the station by the whaling fleet. In the last fishing season about 1,000 whales were killed, each vessel usually returning to the station with from four to six dead whales in tow. Three large transports are employed in carrying the oil to Buenos Aires, where they load up with coal and supplies for the station. On one occasion, the supply of empty barrels at South Georgia gave out and to avoid this embarrassment in future, twelve iron tanks have been provided, each of which will hold 350 barrels of oil. Of the output last season, 9,000 barrels of oil were retained for consumption in Argentina and 18,000 barrels were shipped to Europe. Companies organized in Scandinavia are entering the same whaling field (*Geog. Zeitsch.*, No. 1, 1909).

AFRICA.

TRANSPORTATION ALONG THE CONGO.—Few transportation enterprises in tropical Africa to-day are of so much importance as the work in progress of extending railroads around the unnavigable stretches of the Congo. This work is being rapidly pushed and, when it is completed, there will be steam transportation, by river and rail, from the mouth of the Congo to Kalengwe on the Lualaba branch of the Upper Congo, 2,185 miles from the Congo mouth. This continuous steam route from the Atlantic into the rich copper region of Katanga, the large south-eastern province of the Belgian Congo, is divided into sections as follows:

Banana to Matadi, ocean and river steamers, 90 miles; Matadi to Leopoldville, railroad (in operation), 248 miles; Leopoldville to Stanleyville, steamboats (a large number in service for years past), 992 miles; Stanleyville to Ponthierville, railroad (in operation for two years), 77 miles; Ponthierville to Kindu, steamer (4 now in the service), 195 miles; Kindu to Kongolo or Buli (railroad now building), 186 miles; Kongolo to Kalengwe, steamer (canalization necessary to make the course available for steamers throughout the year), 397 miles.

Two commissions have made a study of the improvements needed in this final stretch of navigation to make it fully available and canalization will be in progress while the railroad is being built just below it. It is expected that this railroad will be completed next year. The details relating to this great enterprise, which will give the rich mining region of Katanga an outlet to the Atlantic, are published in *Le Mouvement Géographique*, No. 2, 1909.

COTTON GROWING AND NIGERIA.—Mr. C. A. Birtwistle, in a paper thus entitled (26 pp., reprinted from *Proc. Roy. Col. Institute*), concludes that the United Kingdom has in Nigeria a proved cotton-growing country and a large agricultural population, with more than sufficient land to produce, eventually, the whole of Lancashire's requirement of raw material of the American quality. Although the present uneven distribution of population and the lack of transport facilities must, for some time, tell against the maximum, he believes that a really appreciable quantity of cotton will come out of Nigeria within five years of the opening of the Kano Railroad. Parliament has sanctioned not only the construction of the railroad from Baro, on the east bank of the Niger, to Kano, the most famous town in the western Sudan, but has also approved of the plan of extending the Lagos line across the Niger at Jebba and thence to the Baro-Kano line near

Zungeru and it is hoped that these lines will be completed in about five years. Large cotton regions will be inaccessible until railroads are provided. The accompanying sketch map shows that the British Cotton Growing Association has established ginneries at 10 points along the Lagos R. R. and the Niger.

THE RAILROAD TO TANANARIVO COMPLETED.—On Jan. 1 last, the railroad connecting the east coast of Madagascar with Tananarivo, the capital of the island, on the central plateau, was completed. Its present eastern terminus is at Brickaville, a short distance in the interior, on the navigable stretch of the Vohitra River, the railroad being connected, by river and canal navigation, with Tamatave, the leading port of eastern Madagascar. Ultimately, the track will be extended to Tamatave. The mountains and forests of the first section of the road, between Brickaville and Mangoro, 103 miles, presented great difficulties and very serious engineering problems, but the second section, between Mongoro and the capital, 64 miles, was less laborious and expensive, both on account of the more suitable nature of the land and of the experience gained in the earlier part of the work. The track at Tananarivo, however, is 2,027 feet higher than at Mangoro. The work was begun in 1901 and it has cost \$11,670,200.

For many generations all commerce between this interior high plateau and the Indian Ocean was carried on the backs of men along one of the most difficult foot routes in the world. This very expensive means of transportation was supplanted after the French occupation, by an automobile freight route, built at large cost; and the railroad now places the capital, the largest town in Madagascar, within easy reach of the sea.

FOSSIL BEDS IN GERMAN EAST AFRICA.—In 1907, Professor Eberhard Fraas discovered a fossil bed in the upper Cretaceous formation of Tendagu, in the Lindi district of German East Africa. This deposit contained a number of bones of Dinosaurs, lying, for the most part, in their natural position in the marl and sandstone from which they have weathered out so that they protrude at the surface. The specimens brought back by Professor Fraas are now mounted in the Museum at Stuttgart, and have been shown to belong to a herbivorous Dinosaur which must have reached a length of about 48 feet. It has been named *Gigantosaurus*. The specimens are incomplete, and so much interest has been aroused by them that the German government has decided to send a special expedition to the region, to examine the deposit in detail and to make additional collections of fossils. (*Scott. Geog. Mag.*, March, 1909.)

PROGRESS OF EGYPTOLOGY.—The *Archaeological Report* for 1907-8 of the Egyptian Exploration Fund describes as the most interesting recent event, connected with the Egyptian discoveries, the publication by Sachau of the petition of the Jews in Elephantine to the Governor of Jerusalem, with its surprising revelation of Jewish religious sentiment not many years after Nehemiah and Ezra had introduced their political and religious reforms. For Egyptology, however, the most interesting results have come from the survey of Lower Nubia where new avenues of information on the history of humanity are being opened. Dr. Elliot Smith and his scientific staff find, in the skeletons and mummies which are being exhumed by the thousand, an unrivalled field for somatological research and for the investigation

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of the history of diseases. Cemetery after cemetery has been discovered and excavated or tested in the history of the population of the Nubian frontier and its relation to Egyptians is thus revealed.

ASIA.

JAPAN'S NEED FOR WIDER FARM LANDS.—In the *World's Work* for April, Mr. Adachi Kinnosuke discusses the necessity that confronts Japan of providing a larger food-supplying area for her growing population. Japan has in her Empire 25,000 square miles of arable land and the serious problem arises how, decently, to maintain the present population of 50,000,000 souls and provide sources of food for the future augmentation of the race. To the farm products, now available, must be added the fish and other food resources of adjacent waters, now yielding annually about \$50,000,000 worth of food substances. Japan has already widened her opportunities by the practical absorption of Korea, but this affords only temporary relief and is not a full remedy for the economic pressure. The remedy must be found, and the Japanese believe they have already found it, in Manchuria where about 15,000,000 people occupy a territory in which there are nearly 200,000 square miles of arable land now only partly and imperfectly cultivated. Mr. Kinnosuke intimates that, while Japan desires only friendly relations with China, food is a necessity and, if the Japanese are not permitted to colonize Manchuria peacefully, there is only one thing that they can do and that is to enter the country, anyhow. In his opinion, the greatest question before Japan is the necessity of assuring the nation adequate food resources in neighbouring regions outside of the Empire.

RECLAMATION OF LAND IN MESOPOTAMIA.—The Beirut correspondent of the Egyptian *Gazette* writes that in October last, four engineers, the vanguard of Sir William Willcocks's expedition to Mesopotamia, arrived there and went to Aleppo by train whence they started by carriage across Mesopotamia for Bagdad. Sir William is adviser to the Ottoman Public Works Department. He began his operations in Mesopotamia last winter with surveying and leveling, as preliminary to the scheme of introducing irrigation on a large scale, especially along the tributaries of the Tigris and the Euphrates. The surveys in Mesopotamia will occupy over two years. Sir William Willcocks takes to his new work, the practical knowledge he gained during many years in the irrigation service of Egypt. In his opinion, the Tigris and Euphrates need works similar to the Nile barrages and regulators and on these types he expects that the works in Mesopotamia will be built. The Irrigation Department of Egypt has expressed its desire to place its information, plans, etc., at his disposal.

TRAVELLERS IN RUSSIA CENTRAL ASIA.—Foreigners are, in principle, not allowed to enter the Russian possessions in Central Asia. Exceptions are, however, made to this rule and permission is granted in special cases to foreigners who send their requests to the Russian government through the diplomatic representatives of their countries at St. Petersburg.

Persons who are not aware of the regulations sometimes enter Russian Central Asia where the local authorities are compelled to stop them. The number of such cases has recently been increasing and the Russian government, therefore, is trying

to give wide publicity to the regulations in question, in the interest of travellers themselves, in order that they may avoid, in future, the many inconveniences arising from infractions of the law. The Russian government declines all responsibility for delays and losses incurred by violators of the law. Requests for permission to travel in Central Asia should be sent several weeks before the date of arrival of the applicants on the frontier of Russian territory in Asia. (*Board of Trade Jour.*, No. 637, 1909.)

EUROPE.

PROFESSOR GOODE'S STUDY OF EUROPEAN PORTS.—Last year, Professor J. Paul Goode, of the University of Chicago, studied the great ports of Europe, in behalf of the Chicago Harbour Commission. In his report to the Commission, "The Development of Commercial Ports" (103 pp.), he gives the results of his visits to all the ports discussed, shows what the European ports are doing and makes suggestions as to the development of Chicago's water front and the utilization of her enormous commercial opportunities. The work includes many black-and-white maps, diagrams, plans and tables, illustrating ports and their growth, the commercial resources tributary to them, the rail and water feeders of their commerce, world-trade routes, etc., and a coloured map of Chicago on which are imposed plans of the Antwerp dock extension and of the Free Port of Hamburg.

The work is a valuable addition to the studies previously made of great ports, of which the most comprehensive example is Dorn's "Die Seehäfen des Weltverkehrs," now somewhat out of date, especially in its statistical material. The author made a careful examination, on the ground, of 14 of the great ports of Europe. His investigations were everywhere facilitated by the local authorities and he studied each port with reference to the hinterland it serves, its organization and administration, its facilities for handling traffic and its relations to the inland and municipal systems of transportation. The topical divisions under which Liverpool is treated, illustrate the methods applied in the discussion of each port:

Liverpool's situation on the estuary of the Mersey, making it the logical gateway of the western half of the Midlands; its advantage in being on the side of England nearest to America, whose cotton supplies the Lancashire spinneries and whose farm staples are a large part of the food of the industrial toilers; the tidal range of 31 feet and the shifting sandbars overcome by remarkable port works; pre-eminence of the port largely due to the port administration, described in some detail; the receipts and expenses of the Harbour Board, the income of the port from vessels and goods and all the factors that make Liverpool a port of the highest excellence.

In Part II, given to the past, present and future of Chicago, are many ideas and comparisons suggested by the preceding study of European ports. Not a few of the ideas are regarded as practicable and advantageous for adoption in the future development of Chicago. In one of the maps, nine European countries are superimposed on the area which is considered to be commercially tributary to Chicago. This Chicago area has now a population of 28,000,000, while the nine European countries are supporting 184,315,000 human beings, a striking illustration of the possibilities of future development in America.

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THE STUDY OF SOILS.—The Society has received from Dr. L. de Lóczy, Professor of Physical Geography at the University of Budapest, and Director of the Hungarian Geological Institute, a Circular issued by the Institute announcing a conference at Budapest on April 14th-24th, 1909, to consider the unsatisfactory conditions of the investigation of soils, from an agricultural point of view, and to take action for their improvement. While geologists of the Institute were studying soils in Rumania and Russia, with colleagues of those countries, they became convinced that to make such researches more valuable it will be necessary to establish a systematic method of comparing soils, based upon their chemical analyses. At present, methods of studying soils, in one or another country, differ widely. It is sometimes impossible, on this account, to compare the results and maps. Many of the public, therefore, distrust these investigations, in spite of every effort to make them serviceable to agriculture.

The conference has been called to discuss the whole subject and to decide, if possible, upon a classification of soils, upon uniform methods of investigation in the field and in the laboratory, and upon a uniform nomenclature. The Institute believes that Hungary is the best place in Europe for the purposes of such a meeting because all varieties of soils are to be found there.

THE CITY OF SAARBRÜCKEN.—The three cities on the Saar (Saarbrücken, St. Johann, and Malstadt-Burbach), became at the beginning of this year one consolidated city with a population of nearly 100,000. The union is the result of long negotiation. The new municipality has the name Saarbrücken.

THE ELEVENTH INTERNATIONAL GEOLOGICAL CONGRESS.—The next session of this Congress will be held in Stockholm in 1910. Mr. J. Gunnar Andersson, Secretary of the Congress, says that the geological problems and phenomena of Sweden and the polar regions will be especially prominent in the programme. A number of important excursions will be arranged and one of them, before the meeting of the Congress, will comprise a visit to northern Sweden and Spitzbergen.

POLAR.

A LETTER FROM MR. STEFÁNSSON.—Writing from Flaxman Island, Alaska, Oct. 14, 1908, Mr. V. Stefánsson says his party of two whites and six Eskimo then had about three months' provisions remaining, partly in Smith Bay, partly at Flaxman. In order to conserve these supplies, Dr. Anderson and one family were to go about 125 miles south into the mountains to try to live on sheep while the rest went west to the Colville Delta where 12 deer had previously been killed and cached. Anderson was later to fall back on the Flaxman reserves while Stefánsson proceeded to the Smith Bay cache. He says: "I suppose we shall pull through with an occasional tightening of the belt. Personally I almost enjoy the prospect."

He had 22 dogs, "all with consistently good appetites." He expected his original plans to work out "fairly well." "We shall spend the first year in the Colville as planned, and shall probably get pretty far to the east next summer, whether it be Coppermine River and its mainland or one of the islands of Banks Land or Victoria."

"I shall probably be able to visit the coveted aborigines of the Colville and (I hope) be able to show some of them the first white man of their experience."

F. S. D.

MR. WELLMAN'S ARCTIC PLANS.—The airship for the Wellman Polar Expedition, which has been completed at Gennevillier's, is to be brought over to London and exhibited at the Aero Exhibition at Olympia on March 19. This airship, which is named "The America," is about 200 feet in length, with a diameter of 50 feet and is designed to carry not merely passengers, but also sledges and dogs. It is fitted with a powerful engine and a petrol tank made specially large.—*London Times* (Weekly Edition), March 5.

DR. F. A. COOK'S ARCTIC EXPEDITION.—Dr. Frederick A. Cook, on Aug. 30, 1907, 35 miles north of Etah, Greenland, parted from the hunting expedition which took him there (one man, Rudolph Franke volunteering to stay with him) and went into winter quarters at that place. He had three-years' supply of provisions, a winter house, coal for three years, three stoves, 150 gallons of alcohol, tools for iron and woodwork, hickory for 15 sleds, scientific instruments, and, in fact, about all that he needed. Between his headquarters' camp and Etah, seventy Eskimo were to winter with 150 dogs, and he intended to draw on this village for dogs and men. He built 13 sledges and made his preparations; and towards the end of February, 1908, with two Eskimo and a number of dogs, he crossed to Cape Sabine and struck westward for Cape Thomas Hubbard, the northern extremity of Axel Helberg Land, where Sverdrup had been in 1900 and Peary in 1906. Arriving there, he sent back a letter, March 17, 1908, to Franke, who had remained at the main camp. This related his progress; stated that he was in good health; that his prospects were excellent; and directed Franke to return to the United States in case Dr. Cook did not come by a certain date. Cook not arriving at the time specified, Franke was picked up at Etah and brought home on Commander Peary's auxiliary steamer.

Dr. Cook was probably striving to reach Crocker Land, seen in the far distance in 1906 by Peary from the heights of Cape Thomas Hubbard. From Crocker Land, Cook would make his attempt on the Pole. As he failed to return to his main camp at the time agreed on, it is feared that some of the numerous obstacles to well-laid plans in the Arctic regions may have placed him in a position where he needs help, and the Arctic and the Explorers Clubs have, consequently, appointed a committee to organize and send out, July 1, 1909, a relief expedition which Mr. Dillon Wallace has volunteered to direct. The office of this committee is at the Explorers Club, 29 West 39th Street, New York. The purchase of a staunch schooner is in prospect on which Mr. Wallace will be taken to Etah with enough supplies for 15 months. Should Cook not have arrived at Upernivik or Etah, Wallace expects to follow his trail to Crocker Land and beyond.

F. S. D.

THE SWEDES IN SPITZBERGEN.—It is 151 years since a Swedish naturalist first went to Spitzbergen and 51 years since the first Swedish expedition began scientific explorations in that archipelago. A great part of the literature of these

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explorations, being written in Swedish, is almost unknown to scientific men in other countries. Last year *Ymer* printed a summary in English of the scientific work of the Swedes in Spitzbergen which now appears separately. Prof. A. G. Nathorst contributes an historical sketch of Swedish scientific work there, a list of leading members of the expeditions follows, J. M. Hulth supplies a bibliography, and a list of maps, compiled by G. De Geer, completes the pamphlet; Dr. Nathorst, mentioning scientific work now in progress, says that Prof. Hj. Théel, assisted by other zoologists, is continuing his great work on the northern and Antarctic invertebrates in the Swedish State Museum; Prof. Nathorst is studying the fossil floras, Prof. J. F. Pompeckij of Göttingen, the Jurassic faunas, Dr. C. Wiman, Carboniferous faunas and Triassic saurians, and the Swedish Commission for the Measurement of an Arc of Meridian is still publishing the results of its investigations. Of the forthcoming maps, the large map of Ice Fiord in 1:100,000, with special maps of the largest glaciers in 1:20,000, are especially mentioned as based mainly on photogrammetrical surveys by G. De Geer, in 1896 and 1908.

VARIOUS:

THE AMERICAN GEOGRAPHICAL SOCIETY.—A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday, March 23, 1909, at 8.30 o'clock P. M.

Vice-President Greenough in the chair.

The following persons, recommended by the Council, were elected to Fellowship:

Cav. Luigi Solari,	George Bird Grinnell,
Dr. Felix Leibinger,	Charles A. Hanna,
Frederick Palmer,	Cornelius Rea Agnew,
George R. Fearing,	Lawrence Gourlay,
Warren Delano, Jr.,	Mayo W. Hazeltine,
Allen W. Evarts,	The Rev. Alexander Hamilton.
P. S. du Pont,	

The Chairman then introduced Mr. Arnold Henry Savage Landor, who addressed the Society on his expedition "Across Widest Africa."

Stereopticon views were shown.

On motion, the Society adjourned.

The number of maps recorded in the *Kartographische Monatsbericht* last year, the first of publication, was 1,226. Dr. Haack, the editor, invites the co-operation of all who are especially interested to make this list of maps as complete as possible.

Dr. Sven Hedin, on January 17, arrived in Stockholm, where the King of Sweden presented him with the Grand Cross of the Polar Star.

Prof. Dr. Max Friederichsen, of the University of Bern, has accepted a call to the chair of geography in the University of Greifswald.

Leading men of Copenhagen have contributed the sum necessary to erect a memorial to the late Mylius Erichsen and his companions, Hagen and Brønlund, who perished in 1907, after completing their survey of the northeast coast of Greenland. The memorial will take the form of a lighthouse to be erected at the entrance to the harbour.

The German section of the German-Portuguese Boundary Commission has completed the delimitation of that part of the Portuguese Angola-German Southwest Africa boundary lying between the Rovuma R. and Ras Lipun. It has been marked with a monument at every kilometer.

The Hudson-Fulton Celebration Commission has issued a brief history of Henry Hudson and Robert Fulton with suggestions as to the general commemorative exercises and children's festivals during the coming celebration. The author is Dr. Edward Hagaman Hall.

The edition of Stieler's Hand Atlas, adapted for the use of the English-speaking public, has been prepared by B. V. Darbshire of Oxford, England. The maps are the same as those in the German edition but the explanatory matter on each sheet is translated into English and appears on the back of the map.

Mr. R. H. Whitbeck, long on the educational staff of the New Jersey State Normal School, of Trenton, N. J., has been appointed assistant professor of geography at the University of Wisconsin. His courses will relate chiefly to the preparation of teachers in the methods of presenting physical and applied geography in secondary schools. He will also devote some time to high school inspection throughout the State.

Congress has appropriated \$5,000 for the erection of a memorial to Major J. W. Powell on the edge of the Grand Canyon of the Colorado, which he explored.

Mr. J. G. Bartholomew, head of the Geographical Institute, the well-known map house of Edinburgh, has been elected an honorary corresponding member of the Geographical Society of Paris. His house has long been prominent among the leading cartographic establishments of the world, and his products, distinguished by scientific geographical supervision, have had a favourable effect upon the improvement of general map-making in Great Britain.

Dr. Gustav Steinmann has returned to Germany after eight months of explorations in Peru. He has made large scientific collections, most of which will be deposited in the Geological Museum of Berlin.

Mr. John William Brooke, of England, was recently murdered while making geological investigations in Szechuan, China. A band of thieves attempted to rob his camp and Mr. Brooke was killed in the ensuing fight.

GEOGRAPHICAL LITERATURE AND MAPS.

(INCLUDING ACCESSIONS TO THE LIBRARY.)

BOOK NOTICES.

Grundzüge der Länderkunde. Von Dr. Alfred Hettner. 1. Band. Europa. Mit 8 Tafeln und 347 Kärtchen im Text. Verlag von Otto Spamer, Leipzig, 1907.

Among German geographers, the study of *Länderkunde*, or regional geography on a scientific basis, has from the days of Ritter down been considered to be as essential and truly scientific a part of geography as the purely physical and mathematical aspects of the same. While this branch of geography can not, to a certain extent, overcome its more or less descriptive aspects, it is the way in which the matter is handled that distinguishes scientific "*Länderkunde*" from that purely descriptive geography which is properly considered an exclusively elementary study. Hettner's "*Grundzüge*" is the latest addition to the list of valuable books along this line by leading German geographers and, while not intended for class-room or reference purposes, strictly speaking, it will be found to serve, at the same time, the prospective student of geography at the university who wants a brief introduction into his chosen subject, and the inquirer coming from different avenues of knowledge who may wish to obtain an understanding of the essentials of geographical knowledge in order to supplement and deepen his understanding of his own special line of work.

The brevity and clearness of the presentation must, in this regard, be heartily commended; technical discussions for which a specialist's knowledge would be required have been avoided, and even though the æsthetical qualities of the style must, at times, be sacrificed in the interest of brevity, the sacrifice is never made at the expense of scientific thoroughness, nor does the text ever become the cut and dry enumeration of facts and generalizations which is often mistaken for a "brief" outline of the subject.

The main divisions of the book are: The continent as a whole, the British isles, the Scandinavian peninsula, Finland with Lapland and Kola, Central Europe, the lowland of Eastern Europe, the Spanish peninsula, Italy, Hungary and Transylvania, the Balkan peninsula, Greece. Each of these chapters is a small monograph of the division in question, discussing its location and size, topography, hydrography, climate, plants, animals, evolution of political divisions, population, religious and intellectual development, commerce and industries, in a systematic, and the various physiographic subdivisions of the region, in a more descriptive, way. Central Europe, for obvious reasons, is given the most detailed treatment.

As may be seen from this general arrangement of matter, and even more from the treatment of the individual chapters, the natural divisions are made the basis of the discussion throughout the book. Thus a certain unity has been secured for the treatment of what belongs together in nature, and the political conditions,

as far as they do not coincide with those of nature, appear as what they really are, namely, as secondary and often artificial and accidental modifications of natural conditions. By means of such an arrangement the chances for tracing the connection between physiographical stimuli and human responses are much superior to those in an arrangement by political divisions exclusively, and the author has not failed to make the most of them. Especially the chapters devoted to the history of the divisions in the light of geographic conditions deserve the interest of the American reader.

In accordance with the custom for scientific books in Germany, the book is not illustrated with pictures; but it has what, to the scientist, means more than pictures, namely, an unusually large number of diagrams and charts of all kinds to illustrate the text, such as special maps of interesting places, geological sketches and diagrams, charts illustrating climate, vegetation, ethnic and religious conditions, density of population, production, lines of traffic, etc. Whoever, in reading a scientific book, has been exasperated with futile attempts to locate on charts, not drawn for that special subject, the place relations of that which he read about, will appreciate how much the text gains in value by such additions, and, no doubt, even the student without any knowledge of the language of the text will welcome the book for this wealth of illustrative material which he may utilize just as well in studying texts in different languages.

The bibliographic notices have been given with regard to the needs of the student rather than to indicate the sources of the author; they include for each division the standard works in the different languages. Another feature which makes the book excellent to work with is the threefold index of names, topics and authors. It is to be hoped that we may not have to wait long for the second volume, which is expected to deal with the other continents.

M. K. G.

Allgemeine und spezielle Wirtschaftsgeographie. By Dr. Ernst Friedrich. 2d edition. 433 pp., 3 maps and index. Göschen, Leipzig, 1907.

The most important changes which the author has made in this second edition of his book have been in the general part. The separate treatment of the dynamic and static parts of economic geography has been abandoned, the discussion of the geographic distribution of products having been combined with that of the working forces of economy. The treatment of the four fundamental stages of economy, on the other hand, has been enlarged, and likewise that of the natural conditions and geographical distribution. Theoretically, Dr. Friedrich still adheres to his method of making man rather than natural conditions the prominent factor in economic geography. The relation of man and nature, as far as economic geography is concerned, he compares to that of the sculptor and the marble: it is the artist, not the material, that is pre-eminently responsible for the finished product. The shape of the latter depends on the equation between the effort of the maker and the resistance of the material; the greater the skill of the former, the better the result. Likewise, in economy, existing conditions are an equation between the resistance of natural conditions and man's skill in conquering them, and economic progress means the gradual emancipation of man from the control of geographical conditions, hence the four economic stages of the author. The resistance of natural conditions, which man has to overcome, differs in the different localities, but so does the effort or skill of man in overcoming it. As, in spite of similar geographic conditions, the economic conditions of any two regions may differ in very striking ways, it is evident that in the equation between nature and

man, which is called economy, the latter is the more potent factor. Thus Dr. Friedrich makes very little allowance for the influence of natural conditions in economic geography, because the ingenuity of man, by means of science and trade, may change the economic aspects of a given region almost beyond recognition. The only geographical factor whose influence man has never been entirely able to overcome are the climatic conditions, and it is in these, therefore, that the author places the relation between economics and geography.

The special part of the book has been brought up to date generally and been enriched by many new statistics. The book remains in its present shape, as it was in the first, one of the most valuable contributions to the subject, from the practical as well as the scientific point of view.

M. K. G.

Alaska. Ein Beitrag zur Geschichte Nordischer Kolonisation. Von Prof. Dr. H. Erdmann. 215 pp., 68 Illustrations and Sketch Maps and Folded Map. D. Reimer (E. Vohsen), Berlin, 1909. (Price, M. 8.)

This book gives the results of personal observation and studies by one of Germany's most noted technical chemists, who visited Alaska in 1906, at the request of the Imperial Minister of Education. Professor Erdmann has brought to his task the experience gained through previous journeys to workings in auriferous gravels and gold mines along the eastern border of the Ural Mountains, from Kotchkar to Berizov, the mines of the Altai Mountains and eastern Siberia, the rich localities of northern Mongolia, Manchuria and Japan, and of China proper, including those of the German sphere of influence in the region of Shantung. The general result of the author's studies is that Germany, sooner or later, must possess gold-producing localities within her own territory, colonial or other, or lose standing among the world powers. Another conclusion is that the local conditions surrounding gold-bearing localities vary indefinitely, and that lucrative extraction is only possible when all these local conditions are taken into account in determining the manner of winning the precious metal. The truth of the latter conclusion is likely to be generally accepted, but the former seems open to debate.

Professor Erdmann's book falls naturally into four main parts in his treatment of the gold fields of Alaska. These are southern Alaska and the primary occurrences, Dawson and the Klondike region, the Fairbanks district in mid-Alaska and the coast district of Nome and the Bering Sea. The author sketches briefly the history of each region. He relates the early discoveries by Joseph Juneau of gold on the mainland in the now exhausted region around the town that bears his name. From the "city" of Juneau one looks across the Gastineau Channel to Douglas Island, where in the year 1881 John Treadwell, a San Francisco builder, unwillingly began to prospect a tract of land that he had been obliged to take in satisfaction of a \$150 debt. Now almost 1,200 men are required there to work the famous Treadwell mine, which exploits the only vein quartz that is successfully mined in all Alaska. The author estimates that, in spite of more than twenty-five years of active mining, the Treadwell property is only in the beginning of its history.

The story of the Klondike district is familiar to most American readers. Gold had been known in rather small amounts for some years at Forty Mile on the Yukon River at the International boundary, when Robert Henderson and George Carmack, in 1896, went upstream prospecting, the former up the Hunker branch, the latter up the Bonanza. When the news spread that Carmack was

washing pay dirt at the rate of \$12 or more per pan, the rush began that depopulated Forty Mile and in ten years resulted in bringing 80,000 people into the region of the Upper Yukon and in developing the gold resources of about 1,200 square miles of territory. The \$120,000,000 in gold that has been won from the Klondike is, according to Erdmann, only half of what may reasonably be expected from the district. The geology of the district has been worked out by the Canadian Geological Survey, and the author gives a concise, clear summary statement of the origin of the "White Channel" formation, containing the precious metal.

The Fairbanks district along the middle course of the Tanana River and its tributaries first came into notice in 1904 and has had a remarkable development, even for a gold field. The gold, like that of the Klondike, is won entirely by washing, and very active work can only be done in the summer season. The rapid development of the district is shown by the presence there in the summer of 1906 of about 6,000 men and the production of \$9,500,000 in gold. The conditions at Fairbanks and vicinity favour underground excavation in winter as well as summer, hence during all the year the gold sand is brought up by buckets and dumped into great conical piles. These piles are hydraulicked and sluiced during the short summer season, when water is abundant.

The coast district of Nome on the border of the Bering Sea is the most peculiar in the method of occurrence of the gold-bearing sand and gravel, the pay being the beach. This has led to special methods of washing which are generally familiar to Americans, but which are well described and illustrated in this book. The Nome region has furnished some remarkable records for placer workings. Sand from Little Creek occasionally runs \$125 to the pan, while at Anvil Creek nuggets weighing 6.6, 7.7 and 11.1 pounds have been found. The gold production of the Seward Peninsula (Nome and vicinity) has risen from about \$15,000 in 1897 to about \$8,000,000 in 1906.

As to the future of mining, Professor Erdmann feels that the Klondike district alone can be thought to be even half exhausted. Although predictions are notoriously unreliable, borings indicate such an extent of secondary gold beds that the author expresses the opinion that Alaska will become the greatest gold producing country in the world. The first decade of its history has seen nearly \$250,000,000 of gold produced there and the next thirty years is likely to see this amount quadrupled before the fields show great signs of exhaustion.

The author's route led by way of the monopolistic railway from Skagway over White Pass to White Horse in the Yukon basin, and thence by steamboat down the rivers to Dawson. From Dawson, Professor Erdmann continued his journey by steamer down the Yukon River to Circle, an important American settlement almost under the Arctic Circle, noting on the journey the great economy of time and labour effected by the steamboat company through substituting oil for wood as fuel. The oil is brought from California, in spite of the discovery of petroleum in Alaska. The geographical relations of mountain and stream, particularly of the Porcupine River, the nature of the gold nuggets, the flora and fauna of the country are given in a few clear sentences. At Circle, our author left the steamer and the usual route of Alaskan travel and took the overland trail to Fairbanks, which gave him opportunity to see an interesting bit of country, bearing great variety of trees, bushes and flowers. Here again, as in the Klondike and everywhere else, he was painfully impressed with the frequent wanton destruction of square miles of forest for the purpose of obtaining a few

cords of charcoal. In the Arctic regions, vegetation, particularly that of the forest, is of extremely slow growth. Of course, the mosquito, the plague of northern woods, played its part in making this journey memorable. The trail is rather blind in many places through subdivision to get around streams and through confusion due to cattle and game tracks. The cattle are brought up from Seattle by steamer to Skagway, thence by rail and steamboat to Eagle or Circle. There they leave the Yukon and are driven overland to the Tanana region. The Northern Light is so bright in Alaska, even in summer, that our author argues for a thorough investigation of the phenomenon and comparison with the Northern Light of Europe and Asia.

The journey down the Tanana and the Yukon was not accomplished without difficulty. The boats are small, and in the latter part of the summer are dangerously over-crowded. The steamboats are of the familiar type of stern-wheelers seen on the Mississippi and Ohio Rivers and other shallow American waters. The Yukon shifts its channel constantly, and one morning the "Leah," on which the author was a passenger, struck a rock that ripped most of the bottom off the hull and caused the boat to sink. After spending three days of discomfort in rainy weather on the boat and in tents on shore, the steamboat "Campbell" rescued the shipwrecked party. She was far too small for the "Leah's" passengers, but they crowded aboard, and, after three and a half anxious days on the river and a bit of the sea, were safely transferred at St. Michael to ocean-going ships that took them to Nome, whence the return to Seattle was easy.

The book maintains its interest from first to last. The author kept his eyes open at every point of his long journey and describes in clear, vivid terms what he saw. Eskimos and their characteristics in different parts of Alaska and other tribes as he met them; travel conditions past and present, with remarks upon the cost and other features of life at the several points visited; wages and the rewards of labour; peculiarities of American and Canadian manners and customs; agriculture and forestry and their future; the metals and minerals associated with the gold,—all these and other valuable points are touched upon and treated briefly in suggestive fashion.

The book is beautifully printed upon heavily coated paper that takes the half tone illustrations well, and one can only wish that photographs had been reproduced more freely.

E. O. H.

Essai Sur Les Principes Des Sciences Mathématiques. Par Louis Delègue. 134 pp., Figures, and Index. Vuibert et Nony, Paris, 1908.

Our knowledge of space is limited in two ways. It is inexact, consisting only of the crude facts of experience; and it is restricted to a limited portion of space. In evolving a geometry of space, it is necessary to idealize these inexact matters of experience, that is, to regard them as mathematically exact. In short, it is necessary to assume the existence of mathematical points and lines, the continuity of space, the invariance of the properties of figures when displaced, and many other things.

When premises contain an assumption, there must be more than one equally valid conclusion; and hence mathematicians have long since learned that there are several systems of geometry, each exempt from self-contradiction but yet not at one among themselves.

It is through the critical examination of the necessary and sufficient premises upon which these systems of geometry are constructed and their mutual inter-

dependence that this scholarly essay establishes numerous points of contact with questions that are of importance to mathematicians.

The learned author has been at great pains to determine the precise meaning of the fundamental, mathematical concepts and to show that, when the intuitive concepts implied in the definitions upon which the various systems of geometry are based have been truly interpreted, the non-Euclidian systems appear as legitimate deductions.

G. W. L.

Altitude Tables. By **Frederick Ball.** xxxiii and 245 pp. J. D. Potter, London, 1907. Price, 15s.

The previously published tables of this nature, by the same author, taken together with the present ones, are in effect a tabulation of the great-circle distance and the true bearing, on the globe or on the celestial sphere, of any place whose latitude does not exceed 60° from every place whose latitude does not exceed 24° , and consequently they constitute a tabulation of the zenith-distance and bearing that the sun, or any celestial body within ecliptic limits, would have at any given time to an observer situated in any geographical position within 60° of latitude from the equator. So that an observer, in a geographical position as yet unknown, about to measure the altitude of a celestial body for the purpose of finding his position, may assume beforehand a geographical position in the region of his station, and find from the tables, within the limitations that have been specified, the zenith-distance and bearing which the celestial body would have if observed from the assumed position; and then, comparing the zenith-distance so taken from the tables, with the zenith-distance shown by the measured altitude, may at once find the position-line, or locus of geographical position, by laying off from the assumed geographical position, in the direction of the bearing, an intercept equal to the difference of these zenith-distances, and drawing through the point thus found, a line at right angles to the bearing.

In order that the tables should not be too voluminous and also with a view to obviate the necessity for laborious interpolation, admirable artifices are introduced by which convenience is attained in their practical use.

G. W. L.

Die Buschmänner der Kalahari. Von Prof. Dr. S. Passarge. iv and 144 pp. Half-tone Illustrations, Drawings, Map and Vocabularies. Dietrich Reimer (Ernst Vohsen), Berlin, 1907. Price, M. 3.

When Dr. Passarge was collecting data for his monumental work on the Kalahari, he improved the opportunity to gather information on the Bushman tribes living in this waste. The difficulty of reaching this people, once scattered widely over South Africa, but to-day largely confined to the middle region of the Kalahari, has prevented adequate study of them. Dr. Passarge's contribution is all the more timely because the Bushmen will soon be extinct. Perhaps Dr. Pöch, who, for months, has been in the central Kalahari, whether he was sent to make an exhaustive study of the natives, will bring home the last important contribution to the history and life of these poor and wandering remnants.

That Dr. Passarge regards the race as one of the most unique and noteworthy is evident from the following quotation:

Gustav Fritsch, the leading ethnologist of South Africa, said that the Bushman is the unhappy child of the time. Nothing is more changeable, untrustworthy, unaccountable, than the character of the Bushman. He unites in himself the greatest contrasts, virtue, and villainy. According to his mood and environment, he is the bravest hero and the most pitiful coward, the most diligent toiler, and the laziest do-nothing, the most harmless, clinging, joyous child, and the gloomiest, most designing and

unscrupulous rascal, in one person. To-day, he fearlessly attacks the wild beast that has seized his child and to-morrow he kills the child in a fit of anger. To-day he protects, to the death, the property and family of his master, but to-morrow he may murder the family in cold blood. No one can endure hunger and thirst as he does, but no one surpasses the eagerness with which he gorges himself with enormous quantities of food,

Only in one respect does he remain true to himself. He has boundless love for freedom; he hates all compulsion. Though he seldom works for the whites, he sometimes accepts service as herder or farm hand; but soon his longing for the freedom of the steppe overpowers him and some fine morning he disappears.

What irony of fate! His unfitness for culture and the dying out of his race are based upon the only staple point of his character. The unhappy child of the time is nearing his end because he subordinates everything to his love of freedom.

Dr. Passarge pictures the Bushman with a graphic pen. His descriptions are controlled by scientific method, but this detracts nothing from the interest of the narrative. He describes their environment, notes their physical peculiarities, social and political organization and the various subdivisions of the race; treats of their clothing, ornaments, tools, and dwellings, their life in present and in former times, their customs and religion, music and musical instruments, and the sculptures and rock paintings of which earlier travellers in the Kalahari told. He accompanies them on their migrations in eager quest for vegetation or animals that will eke out their meagre food supply, and speaks at length of their character and real ability. The volume closes with comparative tables of words, from six of the Bushman languages or dialects. The black and white map shows the distribution of the most important groups of them in the Kalahari.

München und Umgebung. Bearbeitet von Dr. M. K. Rohe. (Beckmann Führer Series.) xvi and 89 pp. and Map, 16 Illustrations and Index. Walter Seifert, Stuttgart, 1909. Price, M. 1.

One of the superior guide books in the Beckmann-Führer series. The plan of this series is to have each city described by a scientific authority, often a professor in one of the Universities. Dr. Rohe's comprehensive description of Munich includes a large amount of information that cannot be given in guide books covering a large field. The plans of all the principal theatres are inserted and everything of especial interest to the traveller is given in considerable detail. Excellent half-tones show aspects of Munich and the surrounding country and the large plan of the city, in colours (see New Maps), is first rate.

Nach Amerika in einem Auswandererschiffe. Das innere Leben der Vereinigten Staaten. Von Mgr. Graf Vay von Vaya und zu Luskod. 318 pp. Gebrüder Paetel, Berlin, 1908. Price, M. 6.

The author, who holds a high ecclesiastical position in the Roman Catholic Church, has visited the United States a number of times, primarily in the interest of European immigrants of his faith. We find in these pages almost nothing of the special purpose of his various visits. He was intensely interested in the characteristics, inventive genius, diligence, ambition and intelligence, of the American people, and his book is devoted to impressions of them and of the material outcome of their activities. A keen observer, he has fully presented these impressions and few foreign works give a broader view of the United States and its inhabitants. Intelligent foreigners may derive from the volume a large amount of accurate information, especially concerning material progress; and they will not be misled by erroneous deductions from the data presented.

The People of the Polar North. A Record. By Knud Rasmussen.

Compiled from the Danish originals, and edited by G. Herring. xvii and 358 pp., 12 Colored Plates, numerous Illustrations, and Map. J. B. Lippincott Company, Philadelphia, 1908. Price, \$5.

Mr. Rasmussen's "New People," in the German edition, was noticed in the *Bulletin* (Vol. XL, p. 564). The present book includes both "New People" and Mr. Rasmussen's later work "Under the Lash of the North Wind." It deals with the civilized, Christianized inhabitants of southwest and west Greenland, with the East Greenlanders, but, first and foremost, it is an account of the little Eskimo group of nomads who wander along the coast between 76° and 78° N. Lat. and whom he calls "The Polar Eskimos."

We have recently heard that Mr. Rasmussen is preparing, in Denmark, to make a six years' tour along the whole of the north coast of North America as far as Alaska, with the slender equipment of kayak and dog sledge, in order to study at first hand the surviving remnant of this once numerous race. The literary results of his studies thus far, well translated into English in this volume, reveal Rasmussen as remarkably well equipped for carrying out researches among the Eskimos. His mother was a South Greenland Eskimo—Danish woman, his father a Dane, and he was educated in Denmark, though most of his life has been spent among his kinspeople in Greenland. He understands all the Eskimo dialects he has met, has had scientific training, is able to live among the natives as one of them, and thus is peculiarly fitted to win their confidence and affection and to acquire an intimate knowledge of their religious beliefs, legends, and personal recollections. His results, fully set forth in this handsome volume, show Rasmussen as a sympathetic and able student of these northern people and the most competent investigator, thus far, of their inner life, beliefs and traditions. About half of the volume is devoted to the fables and legends of the people of which the author has collected a rich store. All the illustrations are characteristic of the natives and their habitat, and the coloured views are striking. The map shows the route of the Danish Literary expedition of 1902, of which Rasmussen was a member, to north Greenland and return.

The International Geography. By Seventy Authors. Edited by Hugh Robert Mill. Latest Edition. xx and 1088 pp., 489 Maps and Diagrams, and Index. D. Appleton & Company, New York, 1909. Price, \$3.50.

The latest edition of this standard book will be especially welcomed because, probably, there is no other one reference volume in English that is so helpful as this one is to English-speaking geographical workers. On the whole, it is our best authority for the English spelling of place-names; and the fact that the whole world is treated in one volume, by the collaboration of a large number of specialists, makes the book a compendium of the most important things in geography that is both authoritative and convenient.

The Guide to South Africa. 16th Edition. xlvi and 478 pp., Colored Maps, Plans and Diagrams. Issued annually for the Union-Castle Mail S. S. Co. Sampson, Low, Marston & Co., Ltd., London, 1909. Price, 75c.

This compilation, with its many maps, and town plans, packed with information for the tourist, sportsman, invalid and settler, is revised every year and is one of the indispensable sources of reference relating to South Africa.

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NEW MAPS.

AMERICA.

U. S. COAST AND GEODETIC SURVEY MAPS.

Nine Maps in the Annual Report of the Superintendent for the Fiscal Year ending June 30, 1908:

(a) Distribution of Principal Astronomic Stations [U. S.] occupied by the Survey for Latitude, Longitude, and Azimuth to June 30, 1908. Scale, 1:7,000,000. Red symbols show stations for latitude, etc.; (b) Positions and Connections of Telegraphic Longitude Stations [U. S.] from 1846 to June 30, 1908. Scale, 1:7,000,000; (c) Routes of Geodetic Spirit Leveling and Positions of Gravity and Tide Stations [U. S.] to June, 1908. Scale, 1:7,000,000; (d) Positions of Magnetic Stations [U. S.] occupied to June 30, 1908. Scale, 1:7,000,000; (e & f) Sketch of General Progress [U. S.] to June 30, 1908, Eastern and Western Sheets. Scale, 1:5,000,000. Symbols show triangulation, reconnaissance, surveyed topography, inshore and off shore hydrography, deep sea soundings and geodetic leveling; (g) Sketch of General Progress, Philippine Islands, to June 30, 1908. Mercator Projection. Covers latitude, longitude, and azimuth determinations, tidal and magnetic observations, triangulation, topography, hydrography and deep sea soundings; (h) General Progress Sketch, Hawaiian Islands and Porto Rico. No scale. The Hawaiian Chart also shows Hawaiian government surveys; (i) Sketch of General Progress in Alaska to June 30, 1908. Scale, 1:5,000,000.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Pacific Ocean, April, 1909.

Pilot Chart of the North Atlantic Ocean, April, 1909.

On the reverse of this chart are summarized the known facts concerning "The Movements of Ice in the North Atlantic Ocean, and their Influence on Navigation." The discussion is illustrated by means of four charts showing the limiting lines of the regions in which field-ice and icebergs have been reported by mariners in the months of April, May and June, for the years 1899-1908, inclusive; and also the general enveloping lines of the regions within which icebergs and field-ice have been reported during the season embraced by the months of April-June. The careful study of the ice reports collected during the past ten years has now made it possible to draw charts of a very considerable degree of accuracy, showing the limits of the regions reached by the ice. Such charts as those now published are of interest to geographers; they are of immediate practical interest and value to the mariner. In spite, however, of the studies thus far made, the subject of ice movements and limits is one that does not yet warrant much in the way of prediction. In the months of April, May and June, icebergs have been as far south as lat. 39° north, and as far east as long. $38^{\circ} 30'$ west. Floating ice may be met with anywhere in the North Atlantic north of latitude 40° , at any season of the year, although its occurrence is so rare that seamen need not be concerned about it.

The North Atlantic bergs have their origin almost exclusively in western Greenland. A few may come around Cape Farewell from the Spitzbergen Sea, and some may be derived from Hudson Bay. The size of the pieces set adrift varies greatly. A berg from 60 to 100 feet to the top of its walls, with its spires and pinnacles reaching from 200 to 250 feet in height, and with a length of 300 to 500 yards, is considered of ordinary size in the Arctic. The part above water is about one-eighth or one-ninth of the whole mass. It is incorrect to suppose

that its depth under water is from eight to nine times its height above, for the measurements above and below water should refer to mass, not to height. A berg may be imagined which is as high out of water as it is deep below the surface, as in the case of a large solid lump of fairly regular shape, with a small, high pinnacle in the centre. We have, for illustration, the well-known authentic case of a berg grounded in the Strait of Belle Isle in sixteen fathoms of water, which had a thin spire about 100 feet in height.

Bergs are formed all the year around, especially in summer, thousands being set adrift each year. They start on their journey southward in the Labrador Current, but their progress is attended with many stops and accidents. Some ground and break up in the Arctic basin. Others reach the Labrador coast, where they keep grounding and floating, some breaking up, and others keeping on to the Grand Bank. All the bergs "made" in one season do not find their way south in the following season. Only a small percentage ever reach the transatlantic steamer routes. Those seen in one season may have been "made" several seasons before. If the bergs drifted south at once, and met with no obstacles, they would make their journey of 1,200-1,500 miles in from four to five months. There may be a difference of one or two years in the time in which two bergs, set adrift simultaneously at the same place, reach a low latitude. It is well known that bergs drift almost entirely with the current. They are often seen forcing their way through heavy ice-fields, directly to windward. Vessels in ice-fields take advantage of this fact by mooring themselves to bergs, thus securing a tow out of the ice.

R. DEC. W.

UNITED STATES.—Map Showing Canyons of the Green and Colorado Rivers. Scale, 1:4,752,000 = 75 miles to an inch. By F. S. Dellenbaugh. Map "F" in "A Canyon Voyage," 2nd Edition, New York, 1908. A good sketch map with canyons in black. That part of the region unknown up to 1871, is shaded, but the course of the Colorado river passing through the shaded area was explored in 1869. Escalante's trail in 1776 is shown in red.

ARGENTINA.—Die historische Entwicklung von Buenos Aires. Scale, 1:54,000 = 0.85 mile to an inch. *Geog. Anzeiger*, Vol. 10, No. 1, Gotha, 1909. An inset of Buenos Aires, scale, 1:150,000, gives the present plan of the city and the main map shows the areas covered by it in the 17th century, in 1888 and 1908. Illustrates an article by Dr. Franz Kühn.

CHILE.—Mapas de la Rejion Andina. Scale, 1:250,000 = 3.95 miles to an inch. Sheets Cautin, Valdivia; Valdivia, Llanquihue; Antofagasta; Curicó, Talca; Concepcion, Bio-Bio; Tacna, Bolados; Taena, Barrios. Scale, 1:250,000 = 3.95 miles to an inch. With triangulation net-work on which each sheet is based. Comision Chilena de Limites, Santiago, 1908.

PANAMA.—The Panama Canal. From the Reports of the Isthmian Canal Commission. Scale, 1:200,000 = 3.15 miles to an inch. With Insets and Profiles. Coloured. Illustrates a paper by Vaughan Cornish. *Geog. Jour.*, Vol. 33, No. 2, London, 1909.

AFRICA.

ABYSSINIA.—Boundary between Abyssinia and British East Africa. Scale, 1:80 miles to an inch. *Scott. Geog. Mag.*, No. 3, 1909. A black and white map showing the frontier between Abyssinia and the Anglo-Egyptian Sudan as determined in 1902 and between Abyssinia and British East Africa as determined in 1907.

EQUATORIAL AFRICA.—Maps of Eastern Equatorial Africa, Showing the Prog-

ress of Exploration: (a) According to Ptolemy, A. D. 150; (b) Immediately before Speke's First Journey, 1856. Scale, 1:15,000,000; (c) Results of Burton, Speke and Grant's Explorations, 1863. Scale, 1:7,500,000; (d) Speke's Original Map showing the Discovery of Victoria Nyanza, 1858; (e) In 1909. Scale, 1:15,000,000. Illustrates a Paper by Sir Wm. E. Garstin. *Geog. Jour.*, Vol. 33, No. 2, London, 1909.

UGANDA PROTECTORATE.—Victoria Nyanza to Lake Kioga (Ibrahim). Scale, 1:300,000=7.89 miles to an inch. Coloured. From a Survey by Lieut. C. E. Fishbourne, R.E., 1907-8. Illustrates his paper. *Geog. Jour.*, Vol. 33, No. 2, London, 1909. Based on triangulation and plane-tableing, with Indian clinometers and aneroids used for determination of heights. Embraces area between 2° N. — 0° 40' S.; 32° 50'—33° 40' E.

ERITREA.—Schizzo Dimostrativo della Colonia Eritrea. Colle Divisione Amministrative. Redatto e Disegnato da Achille Dardano. Scale, 1:2,500,000=39.4 miles to an inch. Inset Plan of Asmara. Scale, 1:75,000. Istituto Geografico del Dott. G. de Agostini & Co., Rome, 1908. A good, clear map of the Colony showing cultural features and administrative divisions.

SAHARA.—Sketch Map to Illustrate the Journey of Hanns Vischer "Across the Sahara from Tripoli to Lake Chad." Scale, 1:4,000,000=63.16 miles to an inch. With Inset of Eastern Sahara, and the Anglo-Egyptian Possessions. Scale, 1:24,000,000. Illustrates Mr. Vischer's Paper. *Geog. Jour.*, Vol. 33, No. 3, London, 1909. The distribution of water, hill features and sand wastes along the route are indicated. The many heights noted are from boiling point observations.

SOUTH AFRICA.—South Africa. Scale, 1:2,500,000=39.4 miles to an inch. 2 Sheets. 15° 30'—35° 20' S.; 11° 40'—39° 20' E. World-Wide Series of Library and Office Maps. W. & A. K. Johnston, Edinburgh, 1909. Price, 10s. net. One of the best maps of South Africa yet issued. The large nomenclature is very clearly printed, the surface forms are expressively outlined and the compilation embraces nearly all the latest material. The distribution of gold, diamonds, copper and coal is shown in bold colouring. The recent discovery of diamonds in German Southwest Africa will, doubtless, be noted in the next edition. Some railroads are not yet constructed as far as the map shows them as completed.

SOUTHERN NIGERIA.—Map of the Western Province of the Colony and Protectorate of Southern Nigeria. Scale, 1:250,000=3.95 miles to an inch. Sheets: 61 W; 73 D and part of C; 73 E; 73 J and part of I; 73 K. Compiled at Survey Department, Lagos. Topographical Section, General Staff, War Office, London, 1907-1908. Price 6d a sheet. The first sheets of a provisional skeleton map published "to meet the demand pending the preparation of a more complete issue." It was found impossible to make a complete triangulation on account of the dense forests, but all information was obtained from actual surveys made either by Mr. E. P. Cotton, Director of the Surveys, or under his supervision. The information includes railroads, district boundaries, hydrography, roads and tracks, telegraph lines and many place names, and astronomical positions. In large areas through which no traverse lines have been run, some features of each region are indicated as "Dense Forests," "Mangrove Swamp," "Many Farms," etc. Though only preliminary, the map will serve many present uses and its scale adapts it for inclusion in the general map of Africa now being issued by the Topographical Section of the War Office.

ASIA.

ARABIA.—Sketch Map to Illustrate a Paper on "Unexplored Western Asia" by D. G. Hogarth. Scale, 1:10,000,000=157.82 miles to an inch. *Geog. Jour.*, Vol. 32, No. 6, London, 1909. Colours show areas accurately surveyed, mapped from route surveys and those very slightly or entirely unknown.

ASIA.—Asia. Scale, 1:9,218,880=145.5 miles to an inch. World-Wide Series, W. & A. K. Johnston, Ltd., Edinburgh and London, 1909. The land communications with Europe are fully shown and the amount of data given for Siberia is somewhat unusual for a map covering the whole of the largest continent. Every name may easily be read, and most of the information is up to date, though the Pilgrim railroad in Arabia has, for some time, been in operation to Medina, a fact that is not shown here. The work deserves to be classed as an excellent wall map for general purposes.

DUTCH EAST INDIES.—Banda Groep. 5 Maps on one sheet; (a) Poeloe Pisang en Noordpunt Lontör (Groot-Banda). Scale, 1:20,000=0.3 mile to an inch. By H. Ph. Th. Witkamp; (b) Poeloe Pisang. Scale, 1:5,000=0.07 mile to an inch; (c) Poeloe Rosengain. Scale, 1:20,000; (d) Kampoeng Rosengain (northeastern part), scale, 1:5,000. In colours and with contours. *Tidsch.* of the Royal Netherlands Geog. Soc., 3rd Series, Vol. 26, No. 1, Leiden, 1909. Illustrates a paper by Mr. Witkamp, "De Drie Buiteneilanden der Banda-Groep."

EUROPE.

THE BALKANS.—Map to Illustrate the Near Eastern Question. Scale, 1:2,533,000=40 miles to an inch. Insets: Europe in 1815 and in 1875, scale, 400 miles to an inch; the Bosphorus and Constantinople, scale, 6 miles to an inch. W. and A. K. Johnston, Edinburgh and London, 1908. Price, 1s. Boundaries in 1861, as proposed by the Treaty of San Stefano in March, 1878, as fixed by the Treaty of Berlin in July, 1878, and as at the present time are shown in colours.

THE BALKANS.—Südost-Europa. Die Balkanhalbinsel, Rumänien u. Österreich-Ungarn bis Wien und Budapest. Scale, 1:2,000,000=31.56 miles to an inch. 3rd Edition. Artaria & Co., Vienna, 1909. Price, M. 2.50. Shows railroads in operation, construction, and projected, and is supplemented by statistical tables of population, railroads, trade, etc., on the margins.

BAVARIA.—Neuester Beckmann-Plan von München. Scale, 1:15,000=1,250 feet to an inch. Illustrates Beckmann Führer "München und Umgebung." Walter Seifert, Stuttgart, 1909. A plan of the city in five colours, showing public buildings in red, private buildings in brown, parks, etc., on a scale so large that the street names are easily read.

BOSNIA-HERZEGOVINA.—Generalkarte von Bosnien und der Hercegovina nebst Dalmatien. Scale, 1:864,000=13.6 miles to an inch. Second Edition. Artaria & Co., Vienna, 1909. Price, M. 2.50. Political and statistical tables, compiled by Dr. Peucker, on the margins. The railroad net and railroad projects are clearly printed and the geographical information mapped is much greater than appears on most atlas sheets.

BULGARIA.—Königreich Bulgarien und Türkisch Thraken. Scale, 1:864,000=13.6, miles to an inch. By Dr. Karl Peucker. Second Edition. Artaria & Co,

Vienna, 1909. Price, M. 2.50. The surveys of the k. k. Militär-geographisches Institut, Vienna, have supplied a great deal of the material now utilized in mapping the Balkans. Many of the best maps of the Balkan States, generalized from the above-mentioned surveys and other material, are produced by Austrian map houses. This map is a fine specimen of the work of Artaria & Co. The nomenclature is very large, hydrography and railroads are clearly shown, and insets give geographical, statistical, and historical information.

DENMARK.—[Hydrographic Office Charts.] (a) Lille-Baelt. Nordlige Del. No. 223. Scale, 1:50,000.

(b) Faerøerne Havne og Ankerpladser, No. 224: (1) Strömö Thorshavn Red. Scale, 1:5,000; (2) Syderö Vaag-Fjord. Scale, 1:20,000; (3) Vaagö Sörvaag-Fjord. Scale, 1:20,000; (4) Bordö Klaks-Red. Scale, 1:20,000; (5) Österö Fugle-Fjord. Scale, 1:10,000; (6) Bordö-Viderö Kvannesund. Scale, 1:10,000; (7) Syderö Trangisvaag. Scale, 1:20,000; (8) Österö Funding-Fjord. Scale, 1:40,000; (9) Strömö Vestmanhavn. Scale, 1:20,000. (c) Islands Sydkyst, Östlige del af Vestrahorn-Portland. Scale, 1:250,000. Udgivet af det kongelige Sökkort Arkivet, København, 1908. Heights and Depths in Meters. Fine specimens of engraved expressions of coastal land forms.

NETHERLANDS.—Kaart van een deel van Groningen en Oost-Friesland in 1350, waarop de tegenwoordige toestand in rood is voorgesteld. Scale, 1:200,000=3.1 miles to an inch. *Tijdsch. of the Royal Netherlands Geog. Soc.* 3rd. series, Vol. 26, No. 1, Leiden, 1909. 6 Tints to show the distribution of the soils of the Netherlands in the Fourteenth century.

RUSSIA.—Population Rurale de la Russie d'Europe. Scale, 1:12,500,000=197.2 miles to an inch. *Annal. de Géog.*, No. 97, Paris, 1909. A black and white map showing density of population and illustrating "Le groupement de la population, rurale en Russie," by A. Woeikoff.

SCOTLAND.—Bartholomew's District Plan of Glasgow. Scale, 2.5 inches to a mile. John Bartholomew & Co., Edinburgh, 1909. Price (paper), 1s. The map is especially adapted for tourists and cyclists. The plan is divided into half mile squares and the routes and all other information are most clearly expressed.

SWITZERLAND.—General Map of Switzerland. Scale, 1:400,000=6.3 miles to an inch. By H. Kümmerly. *Geographischer Karten-Verlag, Kümmerly & Frey & A. Francke, Bern*, 1909. Price (paper), M. 3.60. A fine map for the tourist or general reader. Colour and light and shade are used to give the effect of relief, hydrography is in blue, railroads in red, and carriage roads, mountain paths, etc., in black.

UNITED KINGDOM.—Map of Wales showing Distribution of mean annual Rain-fall. Scale, 1:760,320=12 miles to an inch. Illustrates a paper by George B. Williams. *Geog. Jour.*, Vol. 33, No. 3, London, 1909. Ten tints used to show the distribution of rain.

AUSTRALASIA AND PACIFIC ISLANDS.

DUTCH NEW GUINEA.—Noordkust Nieuw-Guinea de Mamberamo (Rochussen-Rivier). Scale, 1:200,000=3.1 miles to an inch. *Tijdsch. of the Royal Netherlands Geog. Soc.* 3rd Series, Vol. 26, No. 1, Leiden, 1909. Black and white.

Numerous soundings in the river, the chief forms of vegetation along its banks and profiles of shores.

DUTCH NEW GUINEA.—Z. W. Nieuw-Guinea. *Schetskaart van het Stroomgebied der Noord-en Noordwestrivier.* Scale, 1:500,000=7.89 miles to an inch. *Tidsch.* of the Royal Netherlands Geog. Soc. 3rd Series, Vol. 26, No. 1, Leiden, 1909. Black and white.

WORLD.

THE WORLD ON MERCATOR'S PROJECTION.—Equatorial Scale, 1:28,000,000. The World Wide Series. W. & A. K. Johnston, Edinburgh and London, 1909. A wall map in two sheets, with the great advantage that every name can easily be read. The scale is also given for different latitudes on the main map and the numerous insets. The main lines of rail and ocean transportation are inserted and distances between ports are given in nautical miles. A good general map for office or library purposes, with some omissions of recent data that might well have been included. The delineation of the mountains in northern Alaska, for example, is antiquated. The place names have been well and critically selected. The numerous insets of the more important regions are on scales $1\frac{1}{2}$ to 2 times the scale of the main map.

OTHER ACCESSIONS.

DASENT, GEORGE WEBBE.—The Story of Burnt Njal, or Life in Iceland at the end of the Tenth Century. From the Icelandic of the Njal Sagas. Maps, etc. 2 Vols. Edinburgh, Edmonston & Douglas. 8vo. 1861.

ENGLISH CATALOGUE of Books for 1908. 72nd Year of Issue. London, Published for the Publishers' Circular, Ltd., by Sampson Low, Marston & Co. 1909.

FOSSETT, FRANK.—Colorado, its Gold and Silver Mines, Farms and Stock Ranges, etc. Tourist's Guide to the Rocky Mountains. 2nd Edition. New York, C. G. Crawford, Printer. 12mo. 1880. [Maps, etc.]

HEWETT, D.—The Traveller's Guide through the United States, and Brief Geographical View of the World. New York. Published for the Author. pr 8vo. 1822.

REICH, EMIL.—Handbook of Geography. Descriptive and Mathematical. 2 Vols. Vol. I: Descriptive. Vol. II: Mathematical. Maps and Diagrams. Duckworth & Co., London, 1908. Price, 12s. 6d.

SEABORN, ADAM.—Symzonia; a Voyage of Discovery. New York. Printed by J. Seymour. 12mo. 1820.

WINSLOW, ERVING.—The Anti-Imperialist League. *Apologia Pro Vita Sua.* Published by the Anti-Imperialist League. Boston. pr 8vo. 1908.

MAPS.

IKI.—Topographical Survey by S. Sekino. Geological Survey of Japan, 1908. Scale, 1:200,000. Size, $11\frac{1}{2}$ x 19 inches.

LEADVILLE MINES. Thayer's Map of the Leadville Mines, California Mining District, Lake County Colorado. Scale, 800 feet to one inch. Size, 26 x 38 inches. Leadville, H. L. Thayer. 1880.

